AGRICULTURAL EXPORT DEPENDENCE AND INCOME INSTABILITY AMONG KANSAS COUNTIES: Economic Dependence Classification of Counties and Comparison of County Total Income Instability, 1969-1986

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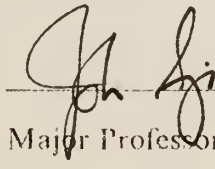

Major Professor

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I. INTRODUCTION

For more than a century, changes in the economic landscape of Kansas have been linked to changes in the foreign demand for Kansas agricultural products, primarily wheat. Rail transportation and agricultural advances such as the mechanical reaper and the binder made possible the production of grain for distant markets, and the Kansas prairie became a system of farms and agricultural service communities. More recently, volatile foreign agricultural demand has strongly affected those areas which remain economically dependent on agriculture, as the volume and value of U.S. agricultural exports during the 1970s and early 1980s followed a "boom and bust" pattern.

Since 1971, unstable export demand for U. S. agricultural products has contributed to farm income instability. During the early 1970s, an export boom and the resulting surge in crop and livestock prices pushed 1973 net farm income to $69.4 billion in real terms, substantially above the 1960-69 average of $36.1 billion. During the early 1980s, an export bust helped induce a financial crisis in agriculture (real net farm income fell from $28.6 billion in 1981 to $12.6 billion in 1983).[1]

The impact of export demand fluctuations is not uniform across rural areas. Areas which specialize in agriculture and, within agriculture, specialize in the production of export-oriented crops such as wheat, corn, grain sorghum, and soybeans are more likely to benefit from export expansions and suffer economically from export declines.[2]

State-level data indicate that some of these areas vulnerable to export-induced income instability are located in Kansas. Among the 50 states, Kansas consistently ranks between 7th and 4th in terms of the estimated value of

agricultural export receipts. Kansas is the top producer of wheat, a crop especially prone to wide swings in export demand.[3]

The purpose of this research is to locate agricultural-export dependent areas of Kansas and to determine whether they have experienced a higher level of income instability than areas less dependent on agricultural exports. Data are available at the county level for total personal income and earnings by industry (farm, mining, manufacturing retail trade, government) providing both a division of the state into 105 subregions and a means to approximately assess the nature of the local economy (the composition of total industry earnings).

Comparing relative income stability among Kansas counties can potentially demonstrate that the impact of export demand fluctuations tends to strongly affect local economies or provide evidence to support an alternative hypothesis, that the impact of export demand fluctuations tends to be, at least in Kansas, muted by a stable nonfarm economy. Agricultural-export dependent counties should exhibit income instability, given fluctuating export demand, but did these counties fare worse than counties which depend on mining or manufacturing?

Comparing relative income stability can also show the presence or absence of differences among Kansas farm-dependent counties. The income instability of agricultural-export dependent counties during the farm crisis, for example, may not have been much different than the instability in counties which rely on farm products but not farm exports.

Relating the pattern of Kansas county-level income instability to the pattern of county-level economic dependence has implications for Kansas rural economic development efforts. If Kansas nonmetropolitan counties tend to be agricultural-export dependent, with a high level of income instability and if unstable counties tend to be contiguous, then Kansas faces a rural economic situation probably

more difficult to alleviate than one in which agricultural-export dependent counties tend to be dispersed among more stable, more economically diversified counties.

II. RELATED RESEARCH: FARM INCOME INSTABILITY AND RURAL DEVELOPMENT

During the 1970s and 1980s U.S. farmers have had to cope with export-induced farm income instability. But the impact of this instability extends beyond the farm household. Related theory and research indicate that (1) agricultural export fluctuations cause financial stress in agriculture, (2) export-induced financial stress is transmitted to the general local economy, and (3) export-induced effects are stronger in counties with both an economic base specialized in farming and a farm sector specialized in the production of export commodities.

In this analysis, counties are considered to be economic regions, exporting to and importing from other regions. Using a political boundary to delineate economic activity distorts economic reality, but it permits the use of county-level economic data and it provides a means to study spatial patterns, because larger regional economies can be divided into many spatial units.

County-level regions in Kansas have not developed uniformly. Some have retained their comparative advantage in grain and livestock production and, conversely, their comparative disadvantage in nonfarm economic activities such as manufacturing. Others have developed local economies based upon nonfarm sectors such as manufacturing, retail trade, or government.

This tendency of regions to develop dissimilar economic structures was addressed over a century ago by Johann Heinrich von Thunen, a German landowner, who observed the impact of growing market towns on land use. He concluded that maximizing land rents would result in a series of concentric land use rings around a market town, with land farther from market assigned a less

intensive use.[1]

Alfred Weber, writing after the Industrial Revolution transformed the German economic landscape, identified several "location forces," which collectively determine the nature of a region's economy. The point of minimum transport cost was to him the prime factor, subject to distorting influences from differences in labor costs and from agglomeration.[2]

Walter Christaller and August Losch later provided the underpinnings for central place theory, which accounts for the growth of a "hierarchy" of communities in terms of market area. Some communities, because of economic agglomeration and more favorable locations in the transportation system, acquire larger market areas which support larger populations and greater economic diversity.[3]

Regions which retain an economic base dependent on agriculture are more vulnerable to fluctuations in farm prices and income. Since the 1930s, government farm programs have been in place to stabilize farm prices and incomes to mitigate the increased economic uncertainty and financial stress which results from agricultural market volatility.

The "internationalization" of U.S. agriculture after 1971 increased the potential impact of agricultural export fluctuations on farm prices and income and, through the farm sector, on the stability of total income in farm-dependent regions. The move from fixed to flexible exchange rates meant that the price of U.S agricultural products to importers would be determined by fluctuations in international currency markets, as well as by agricultural market forces. The increasing share of U.S production of key commodities such as wheat, corn, and soybeans going to the export market made international agricultural market supply and demand fluctuations more powerful determinants of market-clearing prices and

quantities.

Luther Tweeten (1979) in *Foundations of Farm Policy*, notes that "price and income instability reemerged as a major problem of agriculture in the 1970s." Agricultural export-related factors such as commodity policies of foreign governments and flexible exchange rates are cited, along with other factors such as inflation and the weather, as "sources of instability."[4]

In the "imperfectly competitive market" for export commodities such as wheat, corn, and soybeans, trading nations, importers and exporters alike, place a priority on internal commodity price stability. Domestic shortages in importing nations during the 1970s were met in the main not by raising prices paid to farmers and thereby increasing the incentive to produce more, but by purchases on the international market. Domestic surpluses in exporting nations, with the exception of the U.S., tended to be sold at current prices rather than stored (Paarlberg and Abbot, 1986).

The United States, as the residual supplier of major commodities traded on the international agricultural market, was better-positioned to take advantage of international demand increases and was more vulnerable to decreases. The 1972-73 export-related surge in commodity prices provided the incentive for a production increase which enabled the U.S. to capture an increasing share of an expanding market during the late 1970s. During the 1980s, U.S. farmers were also less insulated from export related declines in commodity prices, experiencing the downside of the U.S. market position, as competing export nations cut into U.S. market share of a generally contracting market. (Johnson, 1975; Schuh, 1984; Hillman, 1983; Krueger, 1983; Paarlberg and Abbot, 1986; Myers, Blaylock and White, 1987; Abbot, Paarlberg, and Sharples, 1987).

The transition from the controlled agriculture of the 1950s and early 1960s

to a more open, export-oriented agriculture occured during a time of increasing potential variability in world agricultural markets. Shifting exchange rates, fluctuations in domestic production in importing nations, and politically motivated trade policy adjustments, such as the the imposition of a grain embargo by the U.S. against the Soviet Union and the Soviet restriction of agricultural imports from the U.S. after the embargo was lifted are examples of the uncertain trading environment (Johnson, 1984; Schmitz, Sigurdson and Doering, 1986; Amstutz, 1984, Schwartz and Parker, 1988).

This uncertainty and volatility was transmitted through agriculture to the general rural economy because agriculture had "lost its uniqueness" not just politically but also in an economic sense. Don Paarlberg, in *Farm and Food Policy*, mentions the disappearing reality of an agriculture insulated from the rest of the economy by farmers' pursuit of farming as "more of a way of life than a business," accepting both lower cash incomes and fewer amenities compared to the nonfarm population.[5]

The export boom of the early 1970s hastened the integration of agriculture into the general economy. "Macroeconomic linkages" strengthened as farm incomes increased, more people and more jobs moved into rural areas during the "population turnaround" and, significantly for later events, farmers increased their use of credit and their debt load (Rausser, Chalfant and other, 1986; Batten and Belongia, 1986; Starleaf, 1982; Penson and Gardner, 1988).

The export downturn after 1981 brought financial stress to agriculture. The decline in demand was exacerbated by continued increases in production of prime export commodities. Thus many farmers were forced service to a high debt load (relative to assets) with a diminished cash flow (a lower level of sales at lower prices) while paying record-high real interest rates. Like the prosperity of the early

1970s, this economic stress was transmitted to rural communities (Ginder, Stone and Otto, 1985; Harrington and Carlin, 1987; Hughes, Richardson and Rister, 1985; Melichar and Irwin, 1985; Henry, Drabenstott and Gibson, 1987).

Export-induced financial stress affected most those areas specialized in the production of export commodities. Production of wheat, corn, and soybeans tends to be concentrated in a few states (Iowa, Illinois, and Indiana for corn and soybeans, Kansas and North Dakota for wheat). Furthermore, production within those states is not uniform. Some counties have "cash-grain" economies, and, like the cash-grain farm operation, are especially vulnerable. (Petrulis, Green, and others, 1987; Ahearn, Bentley and Carlin, 1987).

Ahearn, Bentley, and Carlin (1988) "classified the 3,069 counties in the contiguous United States into farming-dependent, farming-important, and not-farming-dependent county types." They applied a methodology used by Bender and Green *et al* (1985), but they included metropolitan counties. A farming-dependent county was required to derive "at least 20 percent" of its 1980-84 labor and proprietors income (LPI) from farming. In a farming-important county, "farming contributed 10-19 percent of the counties LPI." Over 1,000 counties were classified as farming dependent or farming important (514 and 540, respectively).[6]

Farming-dependent counties as a group were smaller in population (1985 average population of 9,957, versus 21,861 for farming-important counties and 109,286 for not-farming-dependent counties. Farming-dependent counties averaged a 35.1 percent dependence on farming, compared to 15.4 percent and 3.4 percent for the other two groups.[7]

The higher overall dependence on farming came mainly at the expense of manufacturing and services (excluding retail trade). Manufacturing accounted for 8.6 percent of the economic base in farming-dependent counties (compared to 18.5

and 25.9 percent). Services dependence percentages were 9.5, 12.2, and 14.8.[8]

Ahearn, Bentley and Carlin assessed the "economic position" of farm operations by dependence group, for three regions (West, Midwest, and South). In the Midwest region (including Kansas, Nebraska, South Dakota, North Dakota and states eastward to and including Ohio) farms in farming-dependent and farming-important counties "experienced more potential financial risk and financial risk in 1986 than did farms in the other two regions." The potential financial risk category required a debt-asset ratio of 0.40 to 0.69. Financial risk required a ratio between 0.70 and 0.99 in combination with a "total household cash income" which was "less than estimated principal payments on farm debt and the household's minimum cash income requirement," or a debt-asset ratio at least 1.00.[9]

In the Midwest region, "nearly a third" of farms in the farming-dependent and farming-important groups "were in a risky financial position in 1986." This compares to an overall percentage of 27 for all farming-dependent counties and 25 percent for the farming-important category.[10]

Petrulis and Green, *et al* (1987) classified nonmetropolitan counties (farming-dependent versus other) to examine the impact of farm-sector financial stress on the overall county-level economy. They used the group of 702 counties classified by Bender and Green *et al* (1985) as being farm-dependent.[11]

Farm operations are not isolated from the county-level economy, but are instead part of the "agribusiness complex," comprised of firms that provide agricultural inputs as well as those which process and market the output of the farm sector. In farm-dependent counties, employment is concentrated in farming and farm-related businesses, with little (relative to other nonmetro counties) diversification into nonfarm sectors such as manufacturing and services.

Counties with more viable nonfarm sectors and larger populations benefit

from the linkages between agriculture and other sectors. For example, the manufacturing sector can provide off-farm employment which, although manufacturing jobs in rural areas tend to be lower-paid and less secure than in metropolitan areas, can reduce financial problems in the farm sector (Otto, 1986; McGranahan, 1987; Bloomquist, 1987).

Export-dependent counties have lagged behind the overall trend in rural America toward increasing dependence on nonfarm income sources. Retail trade activity is linked to fluctuations in farm income. A smaller nonfarm sector means farm income fluctuations are more directly translated into fluctuations in county total personal income (Pulver and Rogers, 1986; Sommer, Petrulis and Riemund, 1988; Henry, Drabenstott and Gibson, 1986).

Economic diversification is no guarantee of better county economic performance, but export-dependent counties have done worse than rural counties in general not only in terms of income instability, but also in terms of other economic performance measures. Even during the export expansion of the late 1970s, for example, employment in export-dependent counties lagged behind nonmetropolitan employment growth (Killian and Hady, 1988; Sommer, Petrulis and Riemund, 1988).

Sommer and Hines (1988) examined the economic performance of 419 export-dependent counties relative to nonmetropolitan U.S. counties and all U.S. counties. Population growth lagged behind nonmetro and U.S. population growth. In fact, population actually declined from 1970-1980 in 52 percent of the 419 counties (compared to 19 percent of nonmetro counties and 18 percent of all U.S. counties).[12]

Employment and income growth in export-dependent counties also lagged. Sommer and Hines (1988) report that "the drop in sales of export-oriented crops

hurt incomes in counties relying on farm exports for much of their economic base." On a per capita basis, income growth in export-dependent counties was comparable to national income growth in the 1970s (51 percent versus 54 percent for the nation, 1970-74 average to 1975-79 average per capita income), but export-dependent counties fell behind in the 1980s (45 percent versus 56 percent, 1975-79 average to the 1980-84 average).[13]

Employment growth in export-dependent counties followed a similar trend. During the 1970s, although direct farm employment declined, the "expansive farm economy buoyed the entire farm-based local economy." Total employment growth slowed relative to the late 1970s in nonmetropolitan counties and for the nation as well as in export-dependent counties, but nonmetro and total U.S. growth was positive (3.9 percent and 6.5 percent, 1980 to 1984), while employment stagnated in export-dependent counties (a 0.1 percent decline).[14]

From the trends described in the above research, economic diversity and uncertainty emerge as hallmarks of rural America. Agricultural-export counties stand out as pockets of lower diversity (greater specialization in agriculture), and higher uncertainty (export-induced economic problems). Differences in county-level economic dependence, apparently, are reflected in differences in income stability and economic performance.

III. DATA and METHODS

Of basic interest in this research is the relationship between county economic dependence and county total income instability in Kansas for the 1969-86 period. The basic thesis to be examined is that dependence on farming and farm exports is directly associated with county-level income instability. In theory, a higher level of agricultural export dependence makes a county's economy more vulnerable to fluctuations in export demand.

Data Sources

The source of most of the variables used in this analysis is the recently (1988) revised series of county-level personal income and employment available on computer disk or tape from the Bureau of Economic Analysis, U.S. Dept. of Commerce, for the period from 1969 to 1986. Revised data for county-level income and sector earnings is also available in published form, in *Local Area Personal Income, 1981-1986*, and unrevised income data for 1969-1984 are available in volumes published earlier of the same series.

The Bureau of Economic Analysis income series is a disaggregation of county total personal income into its component parts. County total personal income equals: A. County total earnings by place of work, which is the sum of sector earnings for farming; agricultural services, forestry and fisheries; mining; construction; manufacturing; transportation and public utilities; wholesale trade; retail trade; services; finance, insurance and real estate; and government, B. Minus- personal contributions for social insurance, C. Plus- adjustment for residence (net out-of-county earnings), D. Plus- unearned income (dividends,

interest, and rent; transfer payments).[1]

Data related to exports (Kansas' share of U.S. agricultural export receipts for wheat, feed grains, and soybeans) are taken from various issues of *Foreign Agricultural Trade of the United States*, Economic Research Service, U.S. Dept. of Agriculture. Export shares have been revised frequently in recent years, so the most recent estimate was used for the four years (1978, 1979, 1981, 1982) included in the estimate of average county export receipts.

County-level production figures for wheat, corn, grain sorghum, and soybeans are taken from *Kansas Farm Facts* included in the *Annual Report* of the Kansas State Board of Agriculture. A county's share of state production of a commodity is assumed to be that county's share of state export receipts for the commodity.

County average yields for wheat from 1969 to 1986 are used in this analysis as a proxy variable for the effects of weather on farm prices and income. Data on yields are those published in the *Kansas Farm Facts* series.

Operational Measurement

The relationship between export dependence and income instability is in this analysis expressed in a regression model, with a measure of county income instability as the dependent variable and a measure of agricultural export dependence as one explanatory variable, along with the dependence of the county's economy on economic sectors such as farming, manufacturing, and government. This analysis also includes a variable to control for the impact of weather (average yield).

The operational measure of the dependent variable is the standard deviation of the year-to-year percentage changes in real county total personal

income for the 1969-1986 period. To compute this, the yearly percentage changes are considered as individual data points. The standard deviation of the percentage changes is the square root of the variance of the yearly changes for a particular county. The more unstable county income is, the larger the deviation will be.

The following classification of Kansas counties employs data for 1978, 1979, 1981, and 1982. Economic dependence is expressed as a percentage ratio, dividing the sum of industry earnings for the four years by the sum of total earnings by place of work and then multiplying by 100. This method uses the same data series and a similar time period as Bender and Green *et al* (1985), with some modifications.

Bender and Green *et al* (1985) used a three-year moving average of farm income for the years 1975-79 to estimate farming dependence, to adjust for the variability of farm income. In the following classification, some adjustment for this variability is made by excluding data for 1980, a year of negative farm industry earnings in many Kansas counties. (In the data series, farm industry earnings are the same as farm income - both include farm proprietor plus farm labor income). An additional modification is the use of four years rather than one (1979) to estimate mining, manufacturing, and government dependence.

The operational measurement of export dependence is less straightforward. Unlike sectors such as farming, manufacturing, and government, there is no simple way to obtain an estimate of "agricultural export earnings" which can then be divided by total county earnings to yield an "export dependence" percentage. Agricultural export earnings are part of farm earnings, and production attributable to exports cannot easily be separated from production expenses attributable to domestic sales. In addition, export receipts are combined with livestock receipts before the subtraction of combined production expenses to arrive at farm cash

income.

The operational measure of export dependence is an estimate of export earnings divided by total earnings by place of work. This figure is computed as a percentage (20.0) of a county's share of Kansas export receipts for wheat, feed grains, and soybeans plus a percentage (20.0) of the "export share" of direct government payments.

A county's share of Kansas export receipts is assumed to be equal to that county's share of Kansas production For example, if average county wheat production for the years 1978, 1979, 1981, and 1982 is two percent of Kansas average production of wheat for those same years, then average wheat export receipts equals two percent of Kansas export receipts for those four years. The share of feed grain receipts is computed using the combined county share of state corn and grain sorghum production (The Kansas export share of feed grain exports is not disaggregated in published sources).

The "export share" of government payments equals average export receipts divided by average crop receipts for the 1978-79/1981-82 period, times average county government payments for the same years. Including a percentage of a share of direct government payments (payments other than Commodity Credit Corporation (CCC) loans) provides a more accurate estimate of "agricultural export earnings" because these payments are not included (as CCC loans are) in marketing receipts figures and because the bulk of these payments go to producers of "export-sensitive" crops such as wheat, corn, and grain sorghum.[2]

The proxy measure for weather is the standard deviation of county wheat yield per acre for the 1969-86 period. Effects associated with the size of a county's economy (such as increased economic diversification and agglomeration) are controlled for by expressing the other variables as percentages.

The choice of the years 1978, 1979, 1981, and 1982 to define a county's economic structure represents an attempt to remain close to previous research while adapting to the Kansas case. Bender and Green *et al* (1985) used the 1975-79 period to define farming-dependent counties. A later study by Ahearn, Bentley, and Carlin (1988) used the 1980-84 period. The years chosen for this analysis therefore provide some continuity of research design, while omitting the disruptive effects of including 1980, a drought year for Kansas agriculture. An additional reason for choosing these four years is related to export market fluctuations. These years coincide with the peak expansion of U.S. exports, and therefore reflect an agricultural sector operating much closer to full capacity than, for example, 1983 or 1977.

Hypothesis Testing

In this analysis, expected relationships are examined by two means. First, counties are grouped into dependence categories and the groups are compared for differences in economic instability. Second, economic dependence is treated as a variable which can be used to statistically explain the variation in income instability exhibited by Kansas counties for the 1969-86 period.

The testing purports to answer the basic research question, why do some Kansas counties display high income instability, while others do not? From theory, the explanation is expected to be that some counties are dependent on farming (and within the farm sector, dependent on an unstable export market), while other counties benefit from a more stable structure of the local economy.

From the basic assumed relationship, hypotheses can be generated. Expected relationships to be examined in this research are:

I. Income instability in agricultural-export counties is greater

than in non-agricultural export counties.

II. As agricultural export dependence increases, income instability will also increase.

The first hypothesis is tested by classifying counties into groups and then testing for statistically significant differences in group income instability means using a one-way analysis of variance (ANOVA) procedure. Multiple regression analysis, using cross-section data and ordinary least squares to select the best fit, is employed to test hypothesis II. A single-equation model is used, specified as:

$Y = B0 + B1X1 + B2X2 + B3X3 + B4X4 + B5X5 + B6X6 + B7X7 + B8X8 + B9X9 + B10X10 + e$, where

Y = Standard deviation of yearly percentage change in real county total personal income 1969-86.

X1 = Farm sector earnings minus agricultural-export earnings over total earnings by place of work, 1978-79/1981-82.

X2 = Mining sector earnings over total earnings by place of work, 1978-79/1981-82.

X3 = Manufacturing sector earnings over total earnings by place of work, 1978-79/1981-82.

X4 = Retail trade sector earnings over total earnings by place of work, 1978-79/1981-82.

X5 = Services sector earnings over total earnings by place of work, 1978-79/1981-82.

X6 = Government sector earnings over total earnings by place of work, 1978-79/1981-82.

X7 = Agricultural export earnings over total earnings by place of work, 1978-79/1981-82.

X8 = Transfer payments over total personal income, 1978-79/1981-82.

X9 = Residual earnings over total earnings by place of work. (Average earnings of the sectors included in total earnings but not considered in the model as a separate explanatory variable, with construction earnings and finance, insurance, and real estate excluded): The sum of earnings for the (1) agricultural service, forestry, and fisheries, (2) wholesale trade, and (3) transportation and public utilities sectors, divided earnings by total earnings by place of work, 1978-79/1981-82.

X10 = Standard deviation of county wheat yield per acre for the 1969-86 period.

e = error term

IV. AN ECONOMIC CLASSIFICATION OF KANSAS COUNTIES

Kansas counties display marked heterogeneity in the size and nature of their economies. To illustrate, in 1986 Sedgwick county total earnings by place of work accounted for one-fifth of the state total, while Hodgeman accounted for less than one percent. Considering industry share of total earnings by place of work as a measure of economic dependence, some Kansas counties are highly dependent on government (Riley, Geary, Leavenworth), others on agriculture (Greeley, Hodgeman), and still others on manufacturing (Atchison, Montgomery). Furthermore, the dependence combinations frequently differ. Many Kansas farming-dependent counties also rely heavily on government, but in several mining (primarily oil and gas extraction) or manufacturing is an important source of total county earnings.

Assigning counties to economic dependence categories involves partially arbitrary decision rules which establish "dividing lines" among categories. Bender and Green (1985) used the sector's percentage contribution to total labor and proprietor income (identical to total earnings by place of work) with differing cut-off levels (20 percent for farming-dependent counties, 30 percent for manufacturing, 20 percent for mining, and 25 percent for government-dependent counties).[1] Ahearn and Bentley (1988), in a study of farm dependence and the financial well-being of farm households, employed a 20 percent cut-off level but also included a "farming-important" category, comprised of "counties where farming contributed 10-19 percent of the county's labor and proprietor income," during 1980-84.[2]

As the farm earnings percentage declines, the likelihood increases that more than one industry category will exceed the minimum percentage. For Greeley county, with a farm earnings percentage of 56.1 for the 1978-1979/1981-1982

period, no non-farm sector exceeds ten percent. But at the other end of the farm-dependent range, percentages for government and retail trade dependence for Logan county fall between 15 and 19 percent. Thus, a list of farm-dependent counties which includes both Greeley and Logan counties does not represent a block of "farm-dependent" counties. Rather, it represents a transition from a subgroup of counties primarily dependent on agriculture to another subgroup in which agriculture is important but not dominant.

At or near the cut-off percentage, counties which exceed the minimum for one time period may fall below the minimum if different years are used. A list of farm-dependent counties should therefore be read as an approximate, not an absolute, categorization.

Farm earnings percentages for the 1977-1978/1981-1982 period attained or exceeded 20 percent in 45 Kansas counties, to form an approximate grouping of Kansas farming-dependent counties. These counties are concentrated in southwest Kansas, with 15 of 19 counties included (not included are Lane, Finney, Ford and Seward counties). Another nine counties are located in the northwest corner of the state, seven in south-central Kansas between Ford and Sedgwick counties, and another seven adjacent to Nebraska in north-central and northeastern Kansas.

As indicated above, using a single-sector decision rule to classify counties fails to account for dependence patterns in other sectors. At lower levels of single-sector dependence, counties which might be better classified as diversified or "dual-dependent" counties are lumped together with counties unquestionably dependent on a single sector such as farming, manufacturing, or government.

To classify counties for analysis in this research, the 20-percent rule is retained, but additional decision rules must also be met. The decision sequence used is as follows:

1. Benchmark sectors (farming, mining, manufacturing, retail trade, services, and government) were selected.

2. Counties with a single sector percentage of 20 or more were selected. (For the retail trade sector, no county showed a percentage of 20 or more).

3. Other sector percentages (farming, mining, manufacturing, retail trade, services, government, construction, wholesale trade, transportation and public utilities, plus finance, insurance and real estate) were examined for each list of potential single-sector dependent counties. Counties with at least one other sector percentage of 20 or more were excluded. Candidate counties with a benchmark sector (farming for farming-dependent counties) percentage of 20-24.9 percent and at least one other sector percentage of 15 percent or more were also excluded.

Of the 45 potential farming-dependent counties, one county (Pawnee) was excluded because another sector exceeded 20 percent. Eight other counties were excluded because a farming sector percentage of 20-24.9 percent coincided with another sector percentage of 15 percent or more: Anderson, Brown, Doniphan, Logan, Marion, Marshall, Sherman, and Woodson. Pawnee county can be considered dependent on both agriculture and government. The other counties can be considered to be either "farming-important" counties or counties approaching diversified status.

Russell county, the only county which exhibited a mining sector percentage at or above 20 percent, does meet the decision rules for single-sector dependence, since other sector percentages were below 15 percent.

Of the 21 potential manufacturing-dependent counties, four (Cherokee, Douglas, Harvey, and Saline) were excluded because another sector percentage

exceeded 20 percent. Four additional counties (Butler, Clay, Crawford, and Phillips) were excluded under the second decision rule.

Six counties exhibited a services sector percentage of 20 or more. Two (Harvey and Saline) combined services dependence with a manufacturing dependence exceeding 20 percent and were excluded. Two others (Ellis and Wabaunsee) were excluded because the percentage for an additional sector exceeded 15 percent, leaving only Cloud and Johnson counties as nominally but officially services dependent.

Six of 10 potential government-dependent counties met both decision rules (Douglas, Geary, Graham, Leavenworth, Morton, and Riley). Graham county barely met the criteria, combining a 20.6 government percentage value with balanced dependence in other sectors. Excluded counties were Douglas and Pawnee (other sector exceeding 20 percent) and Elk, Miami, and Shawnee.

Final classifications for farming, mining, manufacturing, services, and government sectors account for 79 of 105 counties (56 assigned to a single-sector category, 6 classified as dependent on more than one sector, and 17 with a benchmark sector percentage of 20-24.9 and a supporting sector percentage of 15 or more. Of the remaining 26 counties, some are anomalies (Coffey county, for example, with a high dependence on construction, reflecting the building of the Wolf Creek power plant), but some can be considered to have diversified economies.

To select diversified counties and those counties with a significant dependence on a single sector the following decision sequence was used:

1. Lists were compiled for farming, mining, manufacturing, retail trade, services and government sectors containing counties exhibiting a benchmark percentage over 15 percent but under the 20 percent cut-off

level previously used.

2. Counties previously classified were excluded, as were other counties with sector percentages of twenty or more (several counties showed a dependence on construction or the transportation and public utilities sector).

3. Counties with no other sector percentage of 15 or more were classified as having a significant single-sector dependence.

4. Counties with at least one other sector percentage in the 15-19.9 range were classified as diversified counties.

Eight counties had a farming dependence percentage in the 15-19.9 range and were not previously classified. Linn county combined a farming dependence percentage of 19 with a 29 percent dependence on transportation and public utilities. Kingman county had a farm sector percentage of 17 and no other sector over 15 percent (government was 14.1). The remaining six counties (Cheyenne, Ellsworth, Nemaha, Ottawa, Rooks, And Scott) met the criteria for diversified counties.

Barton and Rooks counties had a mining sector percentage in the 15-19.9 range. Rooks, as seen above, combined a significant mining sector dependence with farming dependence ("farming/mining" diversified). Barton county combined mining and services.

Of six counties with a manufacturing percentage in the 15-19.9 range, one (Pottawatomie) had a sector percentage exceeding 20 percent (construction). Ellsworth and Nemaha were previously classified as diversified counties. Of the remaining three counties, Seward had no other percentage of 15 or more, leaving Finney and Sumner as new additions to the diversified category.

Four counties had a retail trade sector percentage in the 15-19.9 range. Logan county was previously classified as diversified. Chautauqua and Dickinson were added to the diversified category. For the services sector, Bourbon county had a transportation and public utilities sector percentage exceeding 20. Greenwood and Pratt counties had no other percentage of 15 or more. Diversified counties not previously classified were Ford, Jefferson, and Mitchell.

Thirty-four Kansas counties were moderately dependent on government. Twenty-six had another sector percentage of 20 or more. Three counties (Jackson, Morris, and Osage) were "single-sector significant" in terms of government sector dependence. Cheyenne, Jefferson, Mitchell, Ottawa, and Sumner counties combined government dependence with another sector dependence in the 15-19.9 range.

In summary, 14 counties were classified as economically diversified. Four counties (Bourbon, Coffey, Linn, and Pottawatomie) were dependent on either construction or transportation and public utilities. Seven counties (Greenwood, Jackson, Kingman, Morris, Osage, Pratt, and Seward) were marginally dependent on a single sector. The final county of the 26, Rice, uniquely recorded a sector dependence of 15-19.9 percent for a non-benchmark sector (transportation and public utilities) with no other percentage of 15 or more.

Tables IV-1 to IV-3 show the final sector dependence classifications for farming, manufacturing, and government, with the location and population of each county. Table V-4 gives the same information for diversified counties. These lists contain those counties clearly dependent on a single economic sector.

Farming-dependent counties (Table IV-1), tend to be located in the western third of Kansas. These counties were relatively homogeneous in terms of population. No county had a population of over 10,000, and many had a

population within the 2,000-4,000 range.

Manufacturing-dependent counties tend to be located in southeast Kansas with substantially higher populations than farming-dependent counties. Two (Sedgwick and Wyandotte) are metropolitan counties.

Only five counties were classified as government dependent, three in northeast Kansas (Geary, Leavenworth, and Riley) and two in northwest Kansas (Graham and Norton). Graham and Norton counties have both a much smaller government sector dependence and a much smaller population than the other three.

With Russell (mining) plus Cloud and Johnson counties (services), 56 Kansas counties are clearly economically dependent on farming, mining, manufacturing, services, or government. Another 17 counties showed a dependence of 20 percent or more on one of these sectors combined with a moderate dependence (15-19.9 percent) on another sector.

TABLE IV-1: FARMING-DEPENDENT COUNTIES, FINAL CLASSIFICATION

No.	Name	Location	Population
1	Barber	SC	6720
2	Chase	SE	3270
3	Clark	SW	2620
4	Comanche	SC	2550
5	Decatur	NW	4660
6	Edwards	SC	4270
7	Gove	NW	3700
8	Grant	SW	6850
9	Gray	SW	5150
10	Greeley	SW	1870
11	Hamilton	SW	2550
12	Harper	SC	7770
13	Haskell	SW	3920
14	Hodgeman	SW	2300
15	Jewell	NC	5250
16	Kiowa	SC	4120
17	Lane	SW	2570
18	Lincoln	NC	4220
19	Meade	SW	4775
20	Morton	SW	3450
21	Ness	SW	5950
22	Osborne	NC	5950
23	Rawlins	NW	4020
24	Republic	NC	7620
25	Rush	SC	4550
26	Sheridan	NW	3570
27	Smith	NC	5920
28	Stafford	SC	5720
29	Stanton	SW	2400
30	Stevens	SW	4670
31	Thomas	NW	8500
32	Trego	NW	4200
33	Wallace	NW	2050
34	Washington	NE	8570
35	Wichita	SW	3170

(Note; Population figure is an average for 1978, 1979, 1981, 1982).

FIGURE 1: FARMING-DEPENDENT
KANSAS COUNTIES

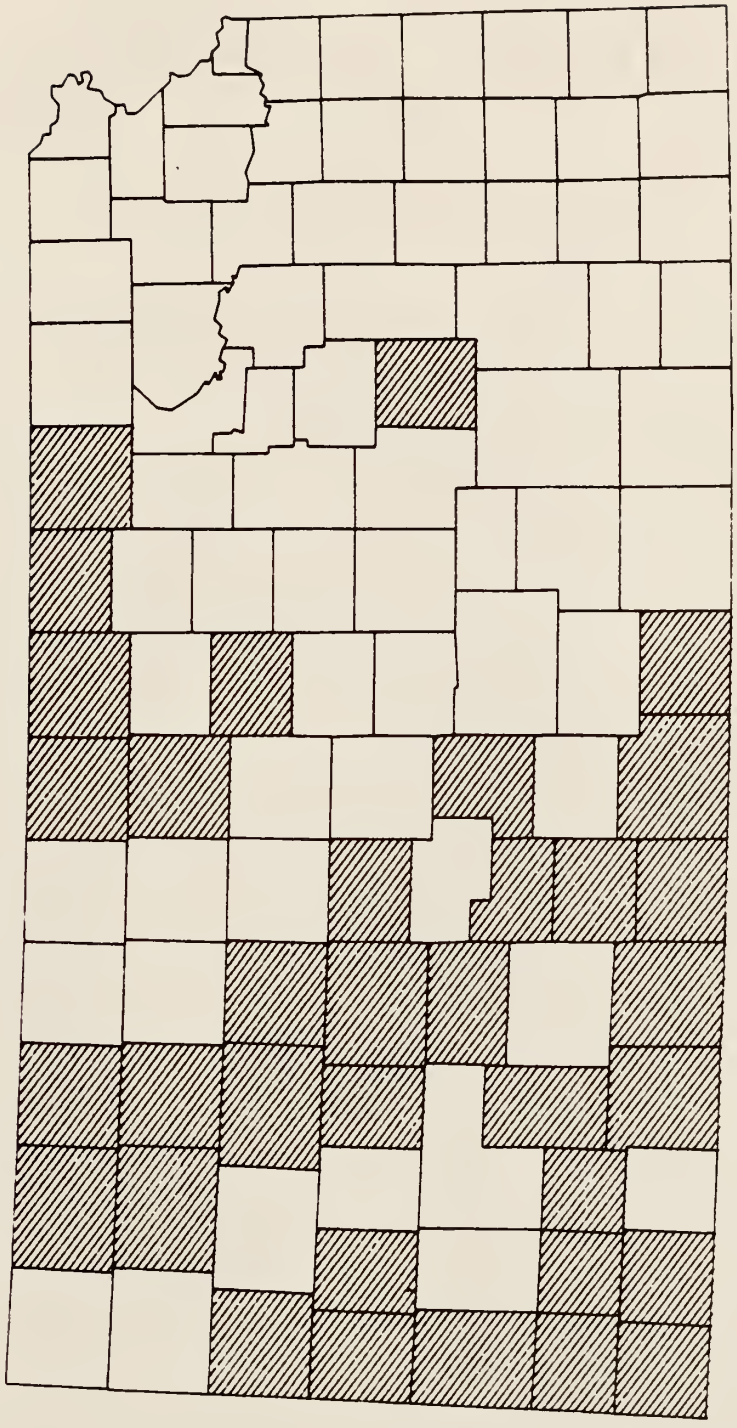


TABLE IV-2: MANUFACTURING-DEPENDENT COUNTIES, FINAL CLASSIFICATION

No.	Name	Location	Population
1	Allen	SE	15750
2	Atchison	NE	18350
3	Cowley	SE	36270
4	Franklin	NE	21920
5	Labette	SE	25700
6	Lyon	NE	35320
7	McPherson	SC	26950
8	Montgomery	SE	23750
9	Neosho	SE	19350
10	Reno	SE	64550
11	Sedgwick	SC	368900
12	Wilson	SE	12020
13	Wyandotte	NE	172800

(Note; Population figure is an average for 1978, 1979, 1981, 1982).

TABLE IV-3: LOCATION AND POPULATION OF GOVERNMENT-DEPENDENT COUNTIES, FINAL CLASSIFICATION

No.	Name	Location	Population
1	Geary	NE	30900
2	Graham	NW	4070
3	Leavenworth	NE	54620
4	Norton	NW	6750
5	Riley	NE	63270

(Note; Population figure is an average for 1978, 1979, 1981, 1982).

FIGURE 2: MANUFACTURING-DEPENDENT
KANSAS COUNTIES

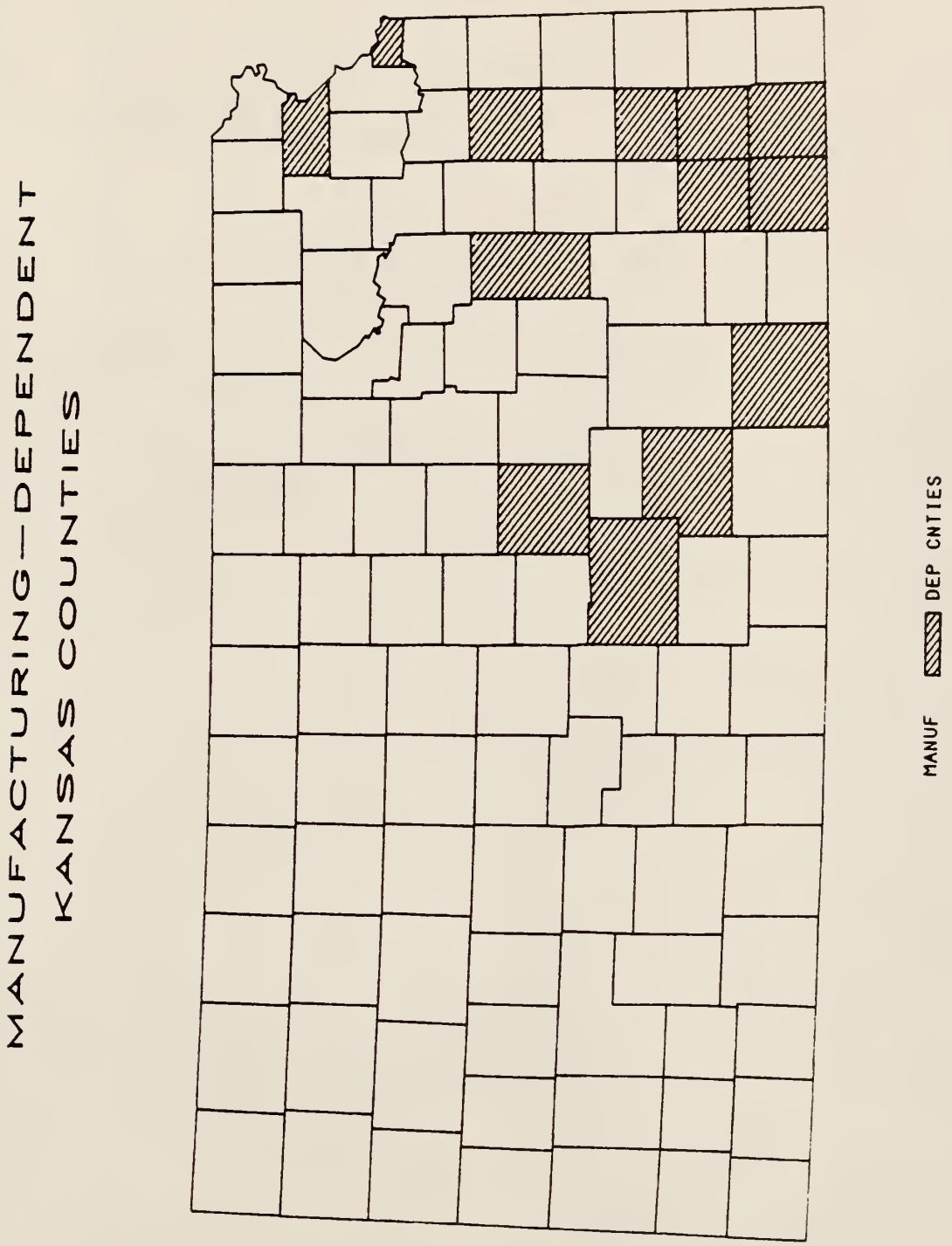
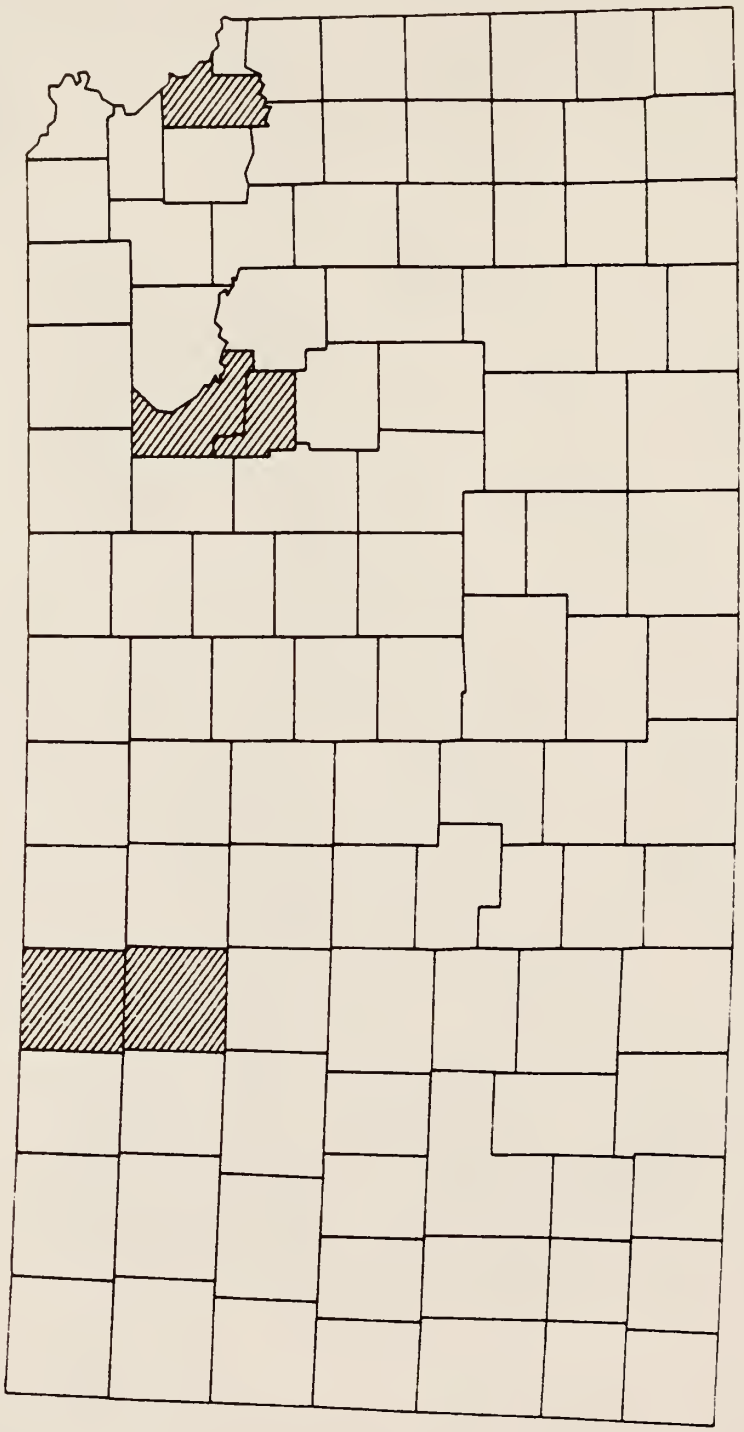


FIGURE 3: GOVERNMENT-DEPENDENT
KANSAS COUNTIES



V. INCOME INSTABILITY AND AGRICULTURAL EXPORT DEPENDENCE

In theory, the level of agricultural export dependence in a county's economy should have a stronger influence on the level of county total personal income instability than other types of economic dependence (mining, manufacturing, retail trade, services, and farming). Moreover, counties classified as "agricultural-export dependent" counties should as a group display a higher level of income instability than do other groups of "single-sector dependent" counties. In fact, for the Kansas case at the level of confidence appropriate to the means used to test these expected relationships, these relationships seem to hold true.

Classification of Agricultural-Export Dependent Counties

Table V-1 shows the upper quintile of Kansas counties, ranked by level of agricultural export dependence. Dependency percentages were computed by dividing an estimate of county agricultural export earnings by total earnings by place of work.

Because the "ag-export sector" is actually a subsector of farming, export dependency percentages are not strictly comparable to percentages used for sector dependence classifications. In addition, the level of "ag-export earnings" is an approximate and somewhat arbitrary estimate of the portion of farm sector earnings attributable to the total impact of the international market on farm revenue (the impact on quantity sold and price received for a commodity, plus the influence of the international market on government payments).

To the degree that the estimate of agricultural-export earnings is accurate, the agricultural export dependency percentages show the relationship between the ag-export subsector and the general level of economic activity in the county

(measured by total earnings by place of work, the same variable used to determine sector dependence percentages). By definition, a given county can be dependent on farming (or another sector) and also be dependent on agricultural export earnings.

Counties in the upper quintile of Kansas counties, ranked by dependence on agricultural exports, consistent with related research, tended also to have a high dependence on farming. Of the 21 counties, only three (Cheyenne, Ottawa, and Kingman) recorded a 1978-79/81-82 average farming dependence percentage of less than 20. Only five (Cheyenne, Ottawa, and Kingman, plus Kearny and Logan) are not included in the final classification of farming-dependent counties. Kearny was classified as dual-dependent (farming plus transportation and public utilities), and Logan was classified as farming-important. The other three counties were classified as diversified, with farming as one of the sectors in the 15-19.9 percent range.

Counties in the bottom quintile all had an export dependence of less than two percent (Table V-2). The bottom three quintiles accounted for only 26 percent of the range of export dependence. (Fifty-four percent of the range was concentrated in the top quintile). The bottom quintile of counties ranked by export dependence was more diverse than the top quintile, in terms of the classifications represented. Manufacturing-dependent counties dominated the quintile (eight of the 13 manufacturing-dependent counties), but three government-dependent counties were included, as were several counties dependent on more than one sector (Bourbon, Douglas, Saline).

No diversified counties or farming-dependent counties were included in the bottom quintile. Diversified counties were distributed throughout the top four quintiles with those diversified counties with farm sector dependence in the 15-19.9

range tending to be located at the top of the distribution.

Farming-dependent counties were concentrated in the upper two quintiles, although several (including Grant, the lowest-ranked farming-dependent county at 56th) were represented in the middle quintile. Additional evidence that export dependence is not perfectly correlated with farming dependence among Kansas counties is the presence of several counties (Cheyenne ranked 5th; Ottawa, 17th; Kingman, 21st) in the upper quintile which had farm sector percentages below 20.

Final classification of "agricultural-export dependent" counties is more difficult and therefore more approximate than sector dependence classifications because agricultural export dependence percentages are estimates. In this analysis, it is assumed that the top fifteen counties are sufficiently dependent on agricultural exports to warrant inclusion in the ag-export dependent group.

This number is consistent with the number of counties categorized as export-dependent employing a revision of the classification methodology used by Sommer and Hines (1988). They established as lower boundary of a 20-percent farming dependence combined with a 50-percent ratio of export commodity receipts to total marketing receipts. They did not include grain sorghum receipts (also an export commodity and an important crop in some Kansas counties) nor did they make provision for the impact of agricultural exports on the general economy in counties which are highly farming dependent.

Using their implicit assumption that the export share of receipts is equivalent to the export share of farming dependence, counties with high levels of farming dependence, such as 40 percent, should be above the cut-off level even though the receipts percentage is somewhat below 50. Applying a modification of the Sommer and Hines (1988) methodology (including grain sorghum and adding a 30 percent farming dependence-40 percent decision rule) substantially increases the

number of Kansas export-dependent counties over the three (Kingman, Rush, Sumner) found by Sommer and Hines.

Agricultural-export dependent counties are located, with the exception of Jewell county, in the western third of Kansas. The top four are located in the southwest portion (Stanton, Hodgeman, Haskell, and Greeley). County populations, again with the exception of Jewell county, are under 5,000.

County Comparisons: Income Instability and Economic Dependence

Agricultural-export dependent counties tended to have high instability of county total personal income, and higher levels of export dependence were associated with higher levels of income instability. Tables V-4 through V-8 show Kansas counties ranked by 1969-86 income instability, with the export dependence percentage and the export dependence rank for each category.

Counties classified as export dependent are by definition ranked one through fifteen in terms of agricultural export dependence. Eleven of these counties are represented in the upper income-instability quintile. The top five counties, ranked by income instability, are ranked within the top ten counties, ranked by export dependence.

Four export-dependent counties (Gray, Logan, Cheyenne, and Rawlins) were ranked in the upper-middle quintile of income instability. Rawlins, the sixth-ranked export-dependent county, ranked lowest (35th) in the income instability range.

Other counties in the upper quintile of export dependence (rank 16-21) were not included in the final classification of export-dependent counties, but were similarly associated with relatively high levels of income instability. Four of the six

counties were ranked in the upper-middle income instability quintile, with Kingman the low county in the group of both for export dependence (21st) and income instability (53rd).

As seen previously, quintile positions of manufacturing-dependent and government-dependent counties indicate these groups have relatively stable county personal income, but the previous quintile positions of farming-dependent counties included twelve counties which are also export dependent. The rankings of the remaining 23 counties gives a general indication of income instability in areas more diversified within the farm sector.

With export-dependent counties removed from the farming-dependent category, non-export farm dependent counties occupy the lower half of the upper income instability quintile. The upper half of the upper quintile is yielded to agricultural-export dependent counties (export-dependent counties occupy 8 of the top ten instability positions).

Agricultural export dependence considered as a variable showed a direct relationship with income instability. Moving from the top to the bottom income instability quintiles, both mean and median values of economic dependence for the 21-county groupings declined as income instability declined. The group of 21 counties which ranked highest in terms of income instability (containing most but not all of the counties included in the final classification of 15 agricultural-export dependent counties) had an average agricultural export dependence of 13.7 percent and a median value of 13.2 percent.

The grouping of counties ranked 22nd to 42nd in terms of income instability recorded a mean export dependence of 10.4 and a median value of 10.7, both lower than the upper quintile. This pattern persisted for the other three income instability quintiles. Means declined from 6.6 percent to 3.9 to 0.09.

Group median values declined from 6.4 to 3.8 to 0.01.

TABLE V-1: AGRICULTURAL EXPORT DEPENDENCE, UPPER QUINTILE OF KANSAS COUNTIES, AND SECTOR DEPENDENCE, 1978-79/81-82 AVERAGE

Rank	Export	Farming	Mfg	Govt
	- - - - - - -		percent	- - - - - - -
Stanton	26.6	42.9	.	16.6
Hodgeman	22.1	45.8	.	16.4
Haskell	20.5	30.7	.	13.6
Greeley	19.9	56.7	1.2	9.4
Cheyenne	19.8	15.1	.	15.0
Rawlins	17.8	32.1	1.2	16.3
Wallace	17.1	42.1	1.2	10.5
Lane	16.2	32.7	.4	16.4
Sheridan	16.1	38.1	.6	13.1
Hamilton	15.7	44.4	.	17.3
Kearny	14.9	29.5	.	15.1
Gray	14.8	34.5	.	9.7
Jewell	14.7	34.1	10.4	16.7
Logan	13.4	20.0	.	16.4
Wichita	13.2	47.5	1.9	9.2
Lincoln	13.1	38.1	6.1	16.8
Ottawa	12.9	16.4	13.4	16.7
Harper	12.7	28.0	6.1	13.9
Edwards	12.5	32.2	13.0	10.9
Smith	12.1	25.0	4.0	12.8
Kingman	11.5	17.2	7.8	14.1

(Note: (.) indicates a percentage of less than one. Source: *Local Area Personal Income* series, 1969-86, BEA, U.S. Dept. of Commerce.)

TABLE V-2: AGRICULTURAL EXPORT DEPENDENCE, LOWER QUINTILE OF KANSAS COUNTIES, AND SECTOR DEPENDENCE 1978-79/81-82 AVERAGE

Rank	Export	Farming	Mfg	Govt
	- - - - - -		percent	- - - - - -
Coffey	1.6	6.5	1.6	5.4
Labette	1.5	2.3	26.1	18.6
Reno	1.5	4.8	28.0	10.5
Miami	1.5	5.0	14.2	20.2
Neosho	1.4	4.7	26.3	13.7
Cowley	1.3	2.6	30.5	16.2
Ellis	1.3	5.2	8.9	15.6
Butler	1.1	4.2	23.8	12.3
Bourbon	1.0	3.0	10.7	9.5
Crawford	.	3.3	20.3	19.7
Salina	.	1.3	21.4	10.6
Lyon	.	2.7	33.8	15.8
Montgomery	.	2.1	34.3	11.1
Riley	.	2.1	34.3	11.1
Douglas	.	1.5	20.9	30.0
Leavenworth	.	2.3	10.8	57.6
Geary	.	1.4	2.8	77.9
Sedgwick	.	.	35.4	10.0
Shawnee	.	.	14.5	20.9
Johnson	.	.	14.1	9.8
Wyandotte	.	.	31.1	15.5

(Note: (.) indicates a percentage of less than one. Source: *Local Area Personal Income* series, BEA, U.S. Dept. of Commerce).

TABLE V-3: AGRICULTURAL EXPORT DEPENDENT COUNTIES, FINAL CLASSIFICATION

Name	Location	Population
Stanton	SW	2400
Hodgeman	SW	2300
Haskell	SW	3920
Greeley	SW	1870
Cheyenne	NW	3770
Rawlins	NW	4020
Wallace	NW	2050
Lane	SW	2570
Sheridan	NW	3570
Hamilton	SW	2550
Kearny	SW	3550
Gray	SW	5150
Jewell	NC	5250
Logan	NW	3525
Wichita	SW	3170

(Note; Population figure is an average for 1978, 1979, 1981, 1982).

FIGURE 4: AGRICULTURAL-EXPORT DEPENDENT KANSAS COUNTIES

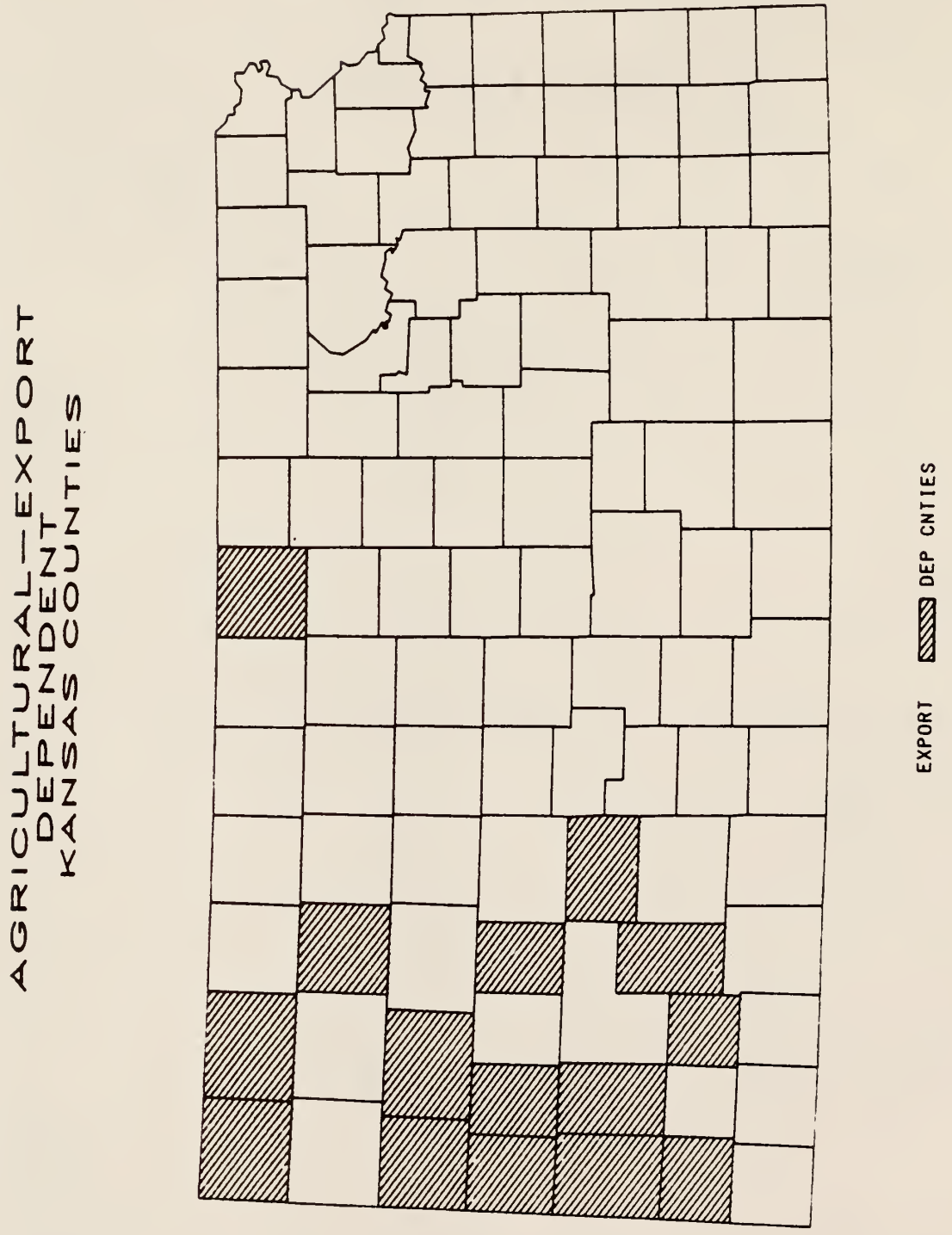


TABLE V-4: UPPER INCOME INSTABILITY QUINTILE,

AG-EXPORT DEPENDENCE PERCENTAGES AND RANKS

Rank	Name	Export Dependence percent	Exp Dep Rank
1	Haskell	20.5	3
2	Stanton	26.6	1
3	Greeley	19.9	4
4	Sheridan	16.1	9
5	Hodgeman	22.1	2
6	Wichita	13.2	15
7	Chase	5.2	63
8	Wallace	17.1	7
9	Lane	16.2	8
10	Decatur	8.4	41
11	Meade	10.7	26
12	Norton	8.5	40
13	Trego	9.4	35
14	Stevens	6.9	44
15	Comanche	10.1	29
16	Ness	8.9	37
17	Kearny	14.9	11
18	Jewell	14.7	13
19	Gove	10.6	28
20	Hamilton	15.7	10
21	Rush	11.4	23

(Source: *Local Area Personal Income* series 1969-1986, Bureau of Economic Analysis, U. S. Dept. of Commerce).

TABLE V-5: UPPER-MIDDLE INCOME INSTABILITY QUINTILE,

AG-EXPORT DEPENDENCE PERCENTAGES AND RANKS

Rank	Name	Export Dependence percent	Exp Dep Rank
22	Edwards	12.5	19
23	Gray	14.8	12
24	Coffey	1.6	85
25	Logan	13.4	14
26	Linn	3.1	72
27	Washington	10.7	27
28	Graham	11.4	22
29	Lincoln	13.1	16
30	Scott	9.8	31
31	Cheyenne	19.8	5
32	Grant	5.7	57
33	Woodson	5.7	56
34	Clark	9.1	36
35	Rawlins	17.8	6
36	Harper	12.7	18
37	Mitchell	9.5	33
38	Republic	10.1	30
39	Kiowa	8.7	39
40	Anderson	5.4	61
41	Stafford	11.2	24
42	Smith	12.1	20

(Source: *Local Area Personal Income* series 1969-1986, Bureau of Economic Analysis, U. S. Dept. of Commerce).

TABLE V-6: MIDDLE INCOME INSTABILITY QUINTILE,

AG-EXPORT DEPENDENCE PERCENTAGES AND RANKS

Rank	Name	Export Dependence percent	Exp Dep Rank
43	Sherman	9.4	34
44	Nemaha	5.5	59
45	Osborne	11.0	25
46	Marshall	6.8	45
47	Elk	3.4	70
48	Pawnee	7.8	42
49	Thomas	9.8	32
50	Allen	12.9	17
51	Ottawa	12.9	17
52	Finney	3.5	69
53	Pratt	6.0	52
54	Kingman	11.5	21
55	Russell	3.9	67
56	Ellsworth	6.4	49
57	Norton	7.0	43
58	Brown	6.5	48
59	Clay	5.8	55
60	Cloud	5.5	60
61	Phillips	5.3	62
62	Seward	1.6	82
63	Morris	6.3	50

(Source: *Local Area Personal Income* series 1969-1986, Bureau of Economic Analysis, U. S. Dept. of Commerce).

TABLE V-7: LOWER-MIDDLE INCOME INSTABILITY QUINTILE,

AG-EXPORT DEPENDENCE PERCENTAGES AND RANKS

Rank	Name	Export Dependence percent	Exp Dep Rank
64	Sumner	8.8	38
65	Rice	6.5	47
66	Rooks	5.8	54
67	Wabaunsee	5.5	58
68	Barber	5.8	53
69	Marion	6.0	51
70	Jackson	4.1	66
71	Osage	4.1	65
72	chautauqua	1.7	80
73	Pottawatomie	2.0	77
74	Cherokee	3.3	71
75	Jefferson	3.7	68
76	Doniphan	6.6	46
77	Dickinson	4.6	64
78	Barton	1.7	81
79	Geary	--	101
80	Franklin	1.6	84
81	Miami	1.5	88
82	Ford	2.8	74
83	Greenwood	1.9	78
84	Wilson	2.7	75

(Source: *Local Area Personal Income* series 1969-1986, Bureau of Economic Analysis, U. S. Dept. of Commerce).

TABLE V-8: LOWER INCOME INSTABILITY QUINTILE,

AG-EXPORT DEPENDENCE PERCENTAGES AND RANKS

Rank	Name	Export Dependence percent	Exp Dep Rank
85	Ellis	1.3	91
86	Atchison	1.8	79
87	Harvey	1.6	83
88	McPherson	2.9	73
89	Lyon	--	96
90	Labette	1.5	86
91	Cowley	1.3	90
92	Neosho	1.4	89
93	Butler	1.3	92
94	Reno	1.5	86
95	Montgomery	--	97
96	Leavenworth	--	100
97	Sedgwick	--	102
98	Saline	--	95
99	Bourbon	1.1	93
100	Johnson	--	104
101	Douglas	--	99
102	Shawnee	--	103
103	Crawford	1.0	94
104	Wyandotte	--	105
105	Riley	--	98

(Source: *Local Area Personal Income* series 1969-1986, Bureau of Economic Analysis, U. S. Dept. of Commerce).

TABLE V-9; CLASSIFICATION AND LOCATION OF KANSAS COUNTIES, UPPER INCOME-INSTABILITY QUINTILE

Name	Location	Classification
Haskell	SW	Ag Export (Farming)
Stanton	SW	Ag Export (Farming)
Greeley	SW	Ag Export (Farming)
Sheridan	NW	Ag Export (Farming)
Hodgeman	SW	Ag Export (Farming)
Wichita	SW	Ag Export (Farming)
Chase	SE	Farming
Wallace	NW	Ag Export (Farming
Lane	SW	Ag Export (Farming)
Decatur	NW	Farming
Meade	SW	Farming
Norton	SW	Farming
Trego	NW	Farming
Stevens	SW	Farming
Comanche	SC	Farming
Ness	SW	Farming
Kearny	SW	Ag Export
Jewell	NC	Ag Export (Farming)
Gove	NW	Farming
Hamilton	SW	Ag Export (Farming)
Rush	SC	Farming

FIGURE 5: UPPER INCOME
INSTABILITY QUINTILE

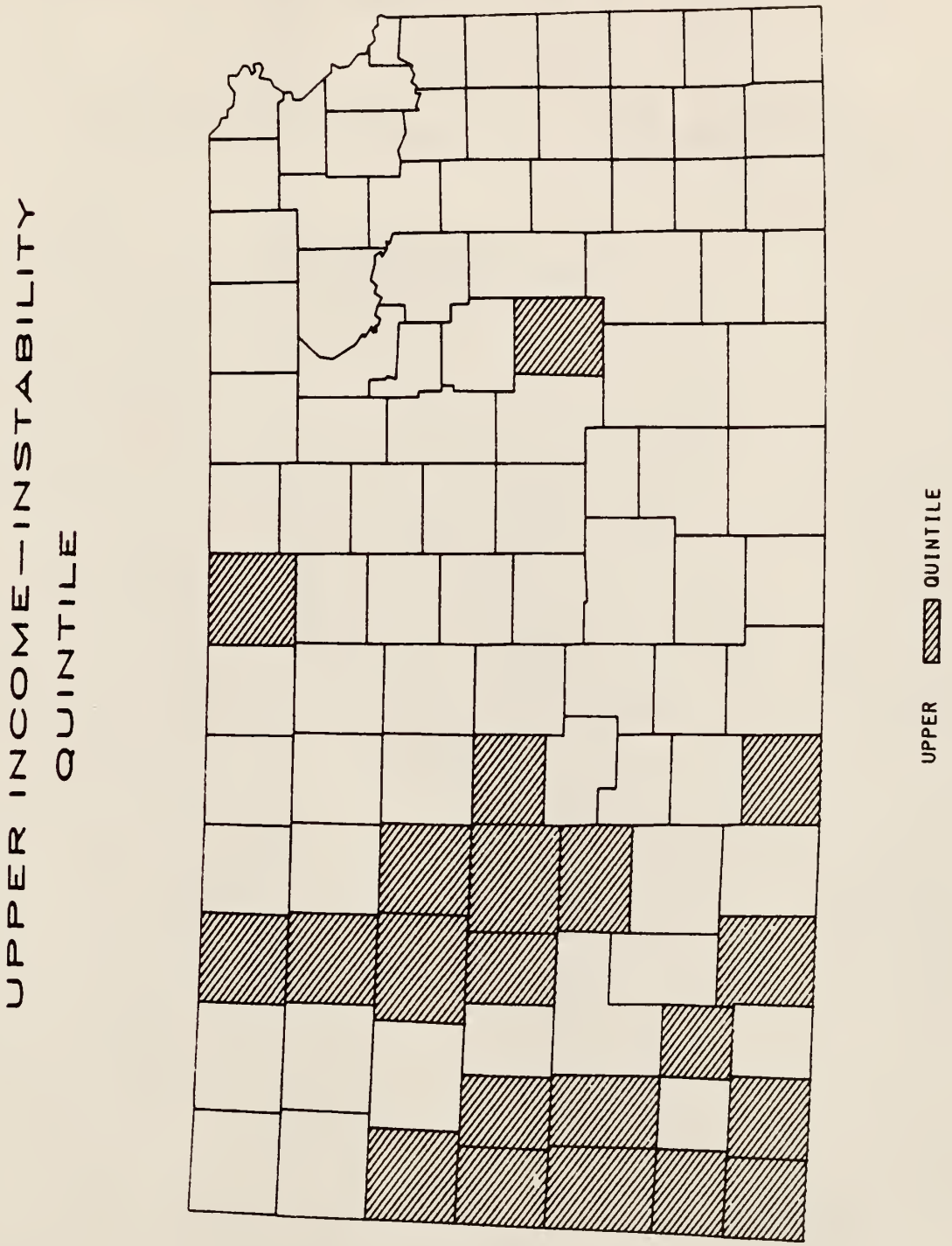
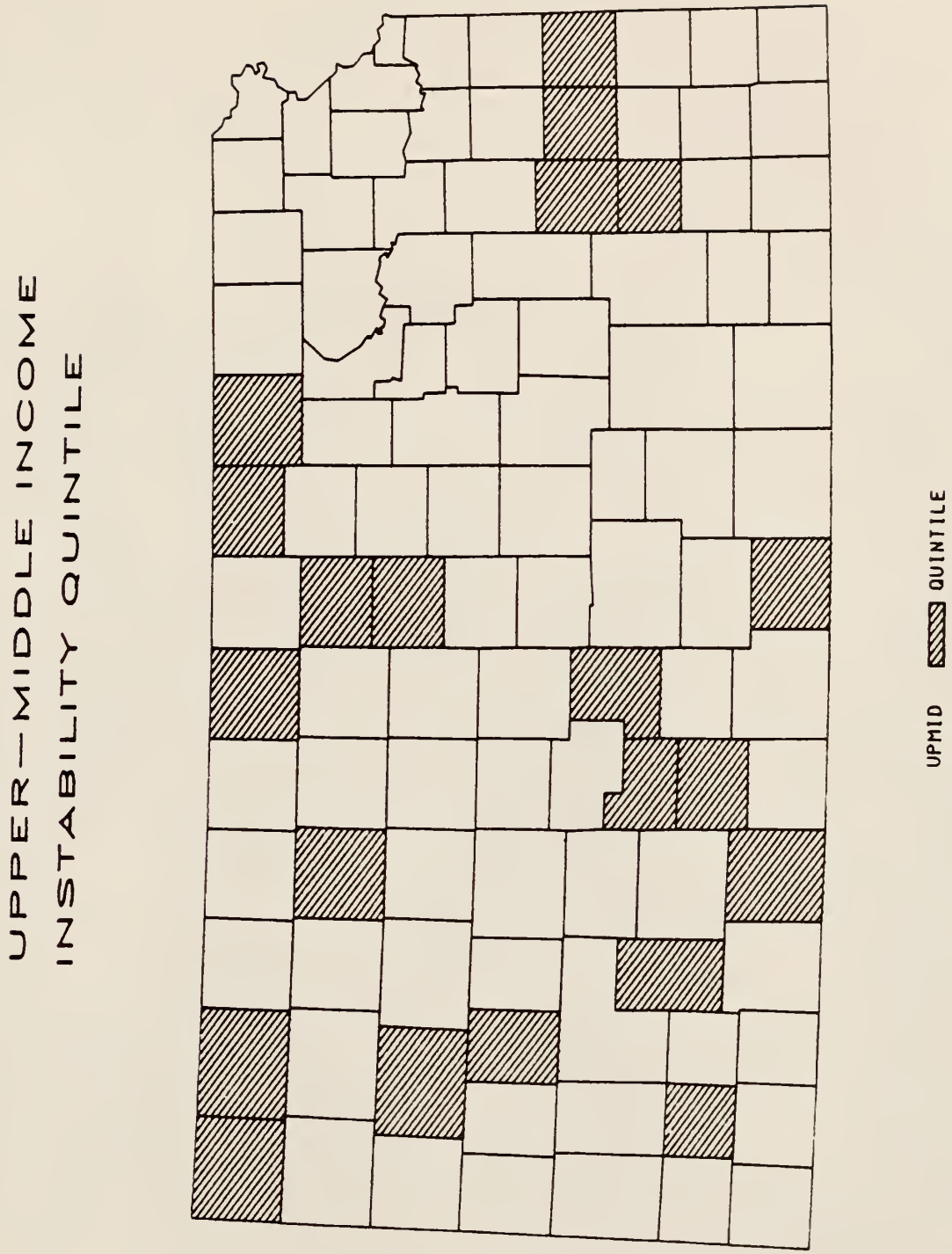


TABLE V-10: CLASSIFICATION AND LOCATION OF KANSAS COUNTIES, UPPER-MIDDLE INCOME-INSTABILITY QUINTILE

Name	Location	Classification
Edwards	SC	Farming
Gray	SW	Ag Export (Farming)
Coffey	SE	Other
Logan	NW	Ag Export
Linn	SE	Other
Washington	NE	Farming
Graham	NW	Government
Lincoln	NC	Farming
Scott	SW	Other
Cheyenne	NW	Ag Export
Grant	SW	Farming
Woodson	SE	Other
Clark	SW	Farming
Rawlins	NW	Ag Export
Harper	SC	Farming
Mitchell	NC	Other
Republic	NC	Farming
Kiowa	SC	Farming
Anderson	SE	Other
Stafford	SC	Farming
Smith	NC	Farming

(Note: (Other) denotes counties not included in the final classifications for agricultural export, farming, manufacturing or government dependence.)

FIGURE 6: UPPER-MIDDLE INCOME
INSTABILITY QUINTILE



Group Comparisons: Income Instability Differences Across Dependence Classifications

Agricultural-export dependent counties and non-export farming dependent counties account for most of Kansas counties with high income instability, as measured by the standard deviation of year-to-year percentage changes in real county total personal income, 1969-86. Of the 42 counties in the upper two income instability quintiles, only one (Graham, government dependent) is included in the final classification of single-sector dependence on mining, manufacturing, servicers, or government. Five counties represented in the upper two instability quintiles were not included in any single-sector dependent category. Linn, ranked 26th, was classified as dependent on a sector other than farming, mining, manufacturing, services or government (transportation and public utilities). Anderson and Woodson counties were considered for the farm sector category but were excluded from the final classification because economic dependence in another sector fell with in the 15-19.9 percent range. Scott and Mitchell counties were placed in the diversified category, with at least two sector percentages in the 15-19.9 range, but none over 20. (Tables V-9 and V-10).

The heavy representation of ag-export dependent and other farm-sector dependent counties in the upper two income-instability quintiles indicates that income instability in Kansas tends to be associated with farming dependence. The geographical location of counties in the upper two income-instability quintiles indicates that income instability in Kansas tends to occur in multiple-county clusters.

Tables V-9 and V-10 show regional locations of the top 42 Kansas counties, ranked by income instability. Most of these counties are located in the

southwest, northwest, or the southcentral (adjacent to southwestern counties) parts of Kansas. In northcentral Kansas, a cluster occurs (Smith, Jewell, Mitchell, Lincoln, Republic, and Washington counties) of counties ranked mostly in the upper-middle quintile. (Jewell is ranked 8th). Another cluster of upper-middle quintile counties is located in southeast Kansas (Anderson, Coffey, Linn, and Woodson).

Of 31 counties in the western third of Kansas, only six are not ranked in the upper two income-instability quintiles. These include Finney and Ford, two diversified counties, as well as Seward in southwest Kansas. Sherman and Thomas ("farming-important" and farming dependent, respectively) are located in nothwest Kansas and were ranked below 42 (43rd and 49th, respectively). Norton, included in the final government-dependent classification, also located in northwest Kansas, was ranked 57th.

In addition to the general tendency toward high income instability, two clusters occur of counties in the upper quintile of income instability. Along the western border of Kansas, the four-county region of Greeley, Wichita, Hamilton, and Kearny has an average income deviation value of 20.2. Another four-county region (Gove, Trego, Lane, and Ness) has an average income deviation value of 16.8. In both cases, there are two counties adjacent to the four-county blocks which are also ranked in the upper income instability quintile (Wallace to the north and Stanton to the south of the Greeley-Wichita-Hamilton-Kearny region, Sheridan to the north and Hodgeman to the south of the Gove-Trego-Lane-Mess region). Rush county, designated as being in southcentral Kansas, is adjacent to and to the east of Ness county, is ranked 21st in terms of income instability).

Most of the counties in the two upper-quintile clusters are ag-export dependent counties, including all six of the counties in the western-most cluster,

indicating a high average income instability for ag-export dependent counties as a group. Agricultural-export dependent counties exhibit a higher average income instability than does any other grouping of counties, including the group comprised of 23 counties which are farming dependent but not ag-export dependent.

Table V-11 shows average income instability values for all 105 Kansas counties and for various subgroups. The group mean for the 15 counties designated as export dependent is 20.13, almost double the overall mean for all counties of 10.13. Moreover, this subgroup had the highest low value of the groups (11.27) and includes the county (Haskell) which recorded the highest income instability of all 105 counties (37.08).

TABLE V-11: AVERAGE INCOME INSTABILITY FOR

DEPENDENCE GROUPS, 1969-86 PERIOD

Group value	Cnties	Mean	Low value	High
			- - Standard Deviation - -	
Kansas	105	10.13	1.46	37.08
Nonmetro	96	10.79	1.46	37.08
Metro	9	3.13	2.10	4.75
Farming-Dependent	35	16.57	6.92	37.08
Export	15	20.13	11.27	37.08
Non-export	23	13.93	6.92	21.33
Manufacturing-Dependent	13	4.25	2.10	9.71
Nonmetro Mfg-Dep	11	4.56	3.35	9.71
Government	4	6.95	1.46	13.35
Nonmetro Govt-Dep	5	6.21	1.46	13.35
Diversified	14	8.23	4.60	12.67
Unclassified	32	8.20	2.11	16.20

(Note: Values are the mean, low and high value of the yearly standard deviation of real county total personal income for the years 1969-1986).

Farming-dependent counties designated as non-export dependent (23 counties) had a group mean of 13.93 and low and high values which, although lower than those for the export-dependent subgroup, were both higher than those for other subgroups such as manufacturing-dependent and government-dependent counties. Both farming-dependent group means were much higher than group means for all nonmetropolitan and all metropolitan counties.

The farming-dependent group includes the 23 counties in the non-export dependent, farming-dependent subgroup, as well as 12 of the 15 counties in the ag-export dependent group (Kearny, Logan, and Cheyenne counties are designated as ag-export dependent but not farming dependent). The mean for the farming-dependent group therefore reflects the high income instability recorded by the two smaller groups.

The 13 manufacturing-dependent counties recorded a much lower mean and range (4.25, low value 2.10, high value 9.71). This situation held even when metropolitan manufacturing-dependent counties (Sedgwick and Wyandotte) were excluded. The 11 nonmetro manufacturing-dependent counties had a higher low value (3.35), but a nearly identical average (4.56).

The government-dependent subgroup contains fewer counties (5 total, 4 nonmetro), and is not easily compared to other subgroups for that reason and because the five counties include three (Geary, Riley, and Leavenworth, the metro county) which are unquestionably dependent on government and two counties (Graham and Norton) marginally dependent on government. Norton, with a government dependence percentage of 27.3, also had a farming dependence percentage of 15.5, and therefore was close to the cut-off level (20-24.9 for government plus 15-19.9 in another sector) used in the final classification. Graham, with a government dependence percentage of 29.6, made the government-

dependent category by virtue of balanced dependence on other sectors. Several (including farming) were in the 12-14 range but none exceeded 15 percent.

Combining a small number of diverse counties results in a range (income instability recorded for Graham county is 9 times that for Riley) of values which is the largest of any subgroup and a deceptive group mean. The mean income instability value for all counties is 6.21, higher than the average for manufacturing-dependent counties, but the average for Geary, Leavenworth, and Riley is 3.1.

The diversified group is comprised of those counties with more than one sector percentage of farming, mining, manufacturing, retail trade, services, or government) in the 15-19.9 range. The group includes differing combinations (farming and mining, manufacturing and government). All 14 are nonmetro counties, one is also ag-export dependent (Cheyenne) and two (Finney and Ford) include service centers (Garden City and Dodge City) for ag-dependent southwest Kansas.

The unclassified subgroup of nonmetro counties includes counties not classified as "single-sector" dependent in a benchmark sector or as diversified. Crawford county was the most stable (the group low value of 2.11), Kearny county the most unstable. (Kearny, an ag-export dependent county, was excluded from the single-sector farming-dependent classification).

To test the hypothesis that average income instability in agricultural-export dependent counties is greater than in non-export farming dependent counties, the 105 Kansas counties were divided into seven mutually-exclusive categories. Metropolitan counties (9) were considered as one group, although two were also classified as manufacturing dependent and one was also classified as government dependent. The 96 nonmetropolitan counties were classified into:

-15 Agricultural-export dependent counties.

-23 Non-export farming dependent counties.

-11 Manufacturing-dependent counties.

- 4 Government-dependent counties.

-13 Diversified counties.

-30 Counties not included in any of the above categories.

These groups correspond to groups shown in Table V-11, with duplications removed. For example, Cheyenne county is included in both the ag-export dependent and the diversified county groupings in Table V-11, but only in the agricultural-export dependent group for statistical comparison of the group means.

To establish in a statistical sense that income instability is greater in agricultural-export dependent counties, it is necessary to (1) observe a higher overall group mean and (2) test statistically the hypothesis that the higher group mean is equal to the mean for each other group. If this hypothesis is rejected for each pairwise combination, then the mean for agricultural-export dependent counties is higher than and different from the means for each of the other groups.

To compare the means, one-way Analysis of Variance (ANOVA) is used, applied to a model with income instability as the dependent variable and a class variable: economic dependence type. Each county in a group is given the same number. Different groups have different numbers.

Means used for comparisons are computed using a least-squares procedure so that the means are equivalent to the expected means for a balanced design (equal numbers in each subgroup). For this reason, the means used for statistical comparisons for some of the smaller groups are slightly different from the observed means. Means used in the statistical testing are:

-Agricultural-export dependent counties: 20.13

-Non-export farming dependent counties: 13.93

-Manufacturing-dependent counties: 4.56

-Government-dependent counties: 6.95

-Diversified counties: 7.90

-Other nonmetro counties: 7.75

-Metro counties: 3.13

The ANOVA procedure, as a special case of regression, gives equivalent output such as an overall F-value, an R-square value and T-tests of the hypotheses that each individual mean is equal to zero, in addition to the comparison of means. For this model, the overall F-value was 131.22, the R-square value was 0.90, and individual means were significantly different from zero at the .01 alpha-level, except the mean for metropolitan counties, which was significantly different from zero at the .05 alpha-level.

The income-instability mean for the agricultural-export dependent group of counties tested as significantly different from the means of each other group. That is, the hypothesis that the means were equal was rejected in each case, at a 0.01 level of alpha. This means that we can say with 99% confidence that the mean of the agricultural-export dependent group is different from the mean of each of the other groups.

The group mean for non-export farming dependent counties was also significantly different from each other mean, at the 0.01 alpha-level. Other pairwise combinations with significantly different means at the 0.01 alpha-level were diversified/metropolitan and other nonmetro/metropolitan. Means of two pairs of groups were significantly different at the .05 alpha-level: manufacturing/diversified and manufacturing/other metro.

Four combinations had means which were statistically not different (the test failed to reject the hypothesis that the means were equal). These were:

-manufacturing/government.

-manufacturing/metropolitan.

-diversified/government.

-diversified/other nonmetro.

-government/other nonmetro.

-government/metropolitan.

An interesting result peripheral to this research is that the mean for nonmetropolitan manufacturing-dependent counties was statistically the same as the mean for metropolitan counties. The manufacturing-dependent group includes some of the larger nonmetro counties in terms of population (Cowley, Lyon, Montgomery, and Reno, all with 1978-79/81-82 average populations exceeding 30,000). It may be that some of these counties have reached a "threshold of agglomeration" which gives them stability equivalent to counties much larger in size.

Regression Results: Relative Impact of Economic Dependence Types on Income Instability

A comparison of group means gives a general indication that, for example, a high level of farming dependence is more likely to be associated with a high level of income instability than is a high level of manufacturing dependence, but part of the information contained in the data (the individual county levels of dependence and instability) is lost in the aggregation process. Regression analysis, in this case regressing income instability on several types of economic dependence, is a means to more accurately assess the relationship between economic dependence and income instability.

This analysis employs a single-equation "model" of the relationship between

the standard deviation of year-to-year percentage changes in real county total personal income for the 1969-1986 period (income instability) and economic dependence, while controlling for the effects of weather. (Some parts of Kansas have more variable temperature and rainfall and thus more variable crop yields, resulting in a more variable farm income due to the greater production variability).

The model purports to explain the variation in income instability in terms of the county-level variation in the standard deviation of bushel-per-acre wheat yields for the 1969-86 period (the control variable for the impact of weather variability) and several types of county-level economic dependence, using an average for the years 1978, 1979, 1981, and 1982:

Ag-export dependence: An estimate of farm sector earnings attributable to the export market divided by total earnings by place of work, times 100 to give a percentage unit of measurement.

Non-export farming dependence: Farm sector earnings minus the above export estimate, all divided by total earnings by place of work, also expressed as a percentage.

Mining dependence: mining sector earnings divided by total earnings by place of work, times 100.

Manufacturing dependence: manufacturing sector earnings divided by total earnings by place of work, times 100.

Retail trade dependence: retail trade earnings divided by total earnings by place of work, times 100.

Services dependence: services earnings divided by total earnings by place of work, times 100.

Transfer payments dependence: Transfer payments (includes Social Security and Medicare payments as well as payments under the food

stamps and Aid to Families with Dependent Children (AFDC) programs) divided by total county personal income, times 100.

Residual dependence (average dependence on the sectors included in total earnings but not considered in the model as a separate explanatory variable with construction earnings and earnings in the finance, insurance, and real estate category excluded): The sum of earnings for the (1) agricultural service, forestry, and fisheries, (2) wholesale trade, and (3) transportation and public utilities sectors, divided by total earnings by place of work, times 100.

Using the ordinary-least-squares method to select the best fit, this cross-section model explained approximately 80 percent of the observed variation in income instability in terms of variation in the explanatory and control variables. The unadjusted R-square value for a model of all 105 Kansas counties was .81; the adjusted R-square, taking into account the number of explanatory variables in the model, was .79. R-square values for a model of the 96 nonmetropolitan counties were slightly lower: unadjusted R-square .79, adjusted R-square, .76.

Both the 105-county and the 96-county models were statistically significant overall. That is, each had an F-value (40.8 and 32.3, respectively) of sufficient size to reject the hypothesis that all of the estimated parameters of the explanatory and control variables are equal to zero.

In a statistical sense, then, the variables as a group are related to income instability. Statistical testing does not determine that economic dependence or yield variability results in or "causes" income instability. The regression model measures only association.

This statistical characteristic has more advantage than limitation for this

analysis, because income deviation for the period 1969-1986 is being explained mainly in terms of county economic structure as it existed around 1980 (averages the years 1978, 1979, 1981, 1982 are used to measure economic dependence). The theoretical assumption implicit to this model is that structural economic dependence circa 1980 will tend to be associated with the overall level of income instability for the 1969-86 period.

Statistical testing of each individual explanatory variable shows which are significantly related to the dependent variable (the estimated parameter is unequal to zero). Table V-12 shows the results of T-tests as well as the parameter estimates.

Not all variables were (statistically) significantly related to income instability. Mining dependence and residual dependence, in this model, were unrelated. The parameter estimates for these explanatory variables were statistically indistinguishable from zero at a reasonable level of confidence. Retail trade dependence, government dependence and (with the effects of exports and yield variability removed), farming dependence also failed to test as significant.

Table V-12: PARAMETER ESTIMATES FOR EXPLANATORY AND CONTROL VARIABLES, 105-COUNTY MODEL

Variable	Coefficient/ (t-value)	significant at alpha level:
Ag-export Dependence	.5604 (6.2)	.001
Non-export Farming dependence	.0777 (.13)	.20
Mining Dependence	-.0090 (-.1)	.95
Manufacturing Dependence	-.1023 (-1.9)	.05
Retail Trade Dependence	-.1937 (-1.2)	.25
Services Dependence	-.2264 (-2.1)	.05
Government Dependence	-.0758 (-1.4)	.15
Transfer Payments Dependence	-.1880 (-1.9)	.10
Residual Dependence	-.0504 (-.7)	.50
Wheat Yield Variability	.6838 (2.1)	.05

(Overall F-value: 40.8; R-square: .81; adjusted R-square .79; intercept t-value: 2.4).

Table V-13: PARAMETER ESTIMATES FOR EXPLANATORY AND CONTROL VARIABLES, 96-COUNTY MODEL

Variable	Coefficient/ (t-value)	significant at alpha level:
Ag-export Dependence	.5462 (6.5)	.001
Non-export Farming dependence	.0718 (1.2)	.25
Mining Dependence	-.0169 (-.2)	.85
Manufacturing Dependence	-.1073 (-1.9)	.10
Retail Trade Dependence	-.1834 (-1.0)	.30
Services Dependence	-.2356 (-1.9)	.10
Government Dependence	-.0734 (-1.2)	.20
Transfer Payments Dependence	-.2029 (-.6)	.10
Residual Dependence	-.0487 (-1.8)	.55
Wheat Yield Variability	.7164 (2.1)	.05

(Overall F-value: 32.35; R-square: .791; adjusted R-square: .791; intercept t-value: 2.3).

Ag-export dependence, manufacturing dependence, services dependence, and wheat yield variability parameter estimates were significant at the .05 level or below. In statistical terms, this means that we reject with 95 percent confidence he hypothesis that the parameter estimate equals zero. Transfer payments dependence narrowly failed to meet the 0.05 alpha-level, but was significant at the 0.1 level.

Parameter estimates for ag-export dependence, manufacturing dependence, and services dependence can be compared directly because they are expressed in the same units of measurement. The parameter estimate gives the per-unit increase in the dependent variable (percentage change standard deviation points) for a unit increase in the explanatory variable (a one-percent change in economic dependence).

Of ag-export, manufacturing, and services dependence, ag-export dependence has the largest influence on income instability. The relationship is positive, meaning that as ag-export dependence increases, income instability will also increase.

The sign of the control variable, the standard deviation of county-level wheat yields, 1969-1986, is also positive, consistent with the assumption that as weather variablity increases, counties will exhibit a greater variability of income. But the parameter estimate cannot be compared directly to dependence parameter estimates, because the units of measurements are different. For example, a one-unit increase in the standard deviation of wheat yields is a large increase relative to the range observed for all counties (values ranged from 4.02 to 9.53 over all 105 counties) while a one-unit increase in ag-export dependence is relatively smaller (values ranged from .01 to 26.66).

Standardized estimates of the parameters (also known as beta-weights)

allow comparison of parameters with dissimilar units of measurement. The standardized estimate of the wheat yield deviation parameter is much smaller (.1174 versus .4993) than the unstandardized estimate. On the standardized basis, wheat yield deviation ranks behind manufacturing dependence (.1563 and .1445, respectively), as well.

To check for possible inordinate influence from metropolitan counties the regression model was also run with the nine metropolitan counties excluded. Parameter estimates differed only slightly from the 105-county model, but slight increases in the observed alpha-levels for two parameters (for manufacturing and services dependence) resulted in those parameters no longer being significant at the .05 level.

The signs of the coefficients did not change from the 105-county to the 96-county model, and were consistent with expected relationships. Ag-export dependence, farming dependence, and wheat yield deviation estimates were positive, indicating a destabilizing influence on income. Signs for retail trade, services, and government dependence were negative, indicating that a high dependence on these sectors will be associated with low year-to-year percentage fluctuations of county income.

Manufacturing dependence and mining dependence coefficient signs were negative, as were those for residual dependence and transfer payments dependence. Both manufacturing dependence and transfer payments dependence coefficients were also statistically significant, warranting the conclusion that as dependence on manufacturing or transfer payments increases, income fluctuations will tend to decrease. (According to the model results, residual dependence and mining dependence probably have no influence on income fluctuations, for most counties).

Regression models were also fit using a combined variable, average

dependence on retail trade/services, in place of the separate variables. This combined "service sector" dependence was second only to ag-export dependence as an explanatory variable.

Parameter estimates for the combined service sector variable were significant at the 0.01 level in both the 105-county model and the 96-county model. Coefficients were -.4285 and -.4310. Standardized estimates (-.2073 and -.2109) also were ranked second in size behind ag-exports dependence.

In conclusion, statistical testing failed to reject the hypotheses that: (I.) Income instability in agricultural-export counties is greater than in non-agricultural export counties, and (II.) As agricultural export dependence increases, income instability will also increase. For many Kansas counties, the agricultural export market is apparently an important determinant of income instability.

Regression Diagnostics

In general, the utility of a piece of research is only as good as the data base, the validity of the operational measures, the effectiveness of the analytical methods, and the care taken in drawing conclusions from the analytical results. This particular piece of research contains useful information, but only within the scope of its limitations.

The prime caveat is to retain a "healthy uncertainty" toward specific results, such as the dependence label attached to a particular county or the regression coefficient obtained for a particular dependence type. Using different decision rules for classification would add some counties to or delete some counties from dependence groups. Using a different regression model would produce different values for the regression coefficients.

Specific analytical results in this research, therefore, vary in terms of the

level of confidence we can realistically have in their accuracy. Some counties would likely be included in a particular dependence classification (for example, Riley and Geary counties being classified as government dependent) in all other analyses. Other counties must be considered to be marginal members of a particular dependence group. Other regression analyses are likely to find agricultural export dependence to be a significant explanatory variable, and a similar relative significance ranking of explanatory variables, but parameter estimates and significance levels would change.

The ordinary-least-squares regression analysis technique is based upon several statistical assumptions. The validity of the results obtained from regression analysis (parameter estimates, significance levels of variables) depends upon the degree to which those assumptions are violated. For example, OLS regression is based upon the assumption that the explanatory variables are not correlated. In practice, some collinearity almost always exists. Mild multicollinearity can be tolerated, but extreme multicollinearity negates the validity of the model.

The assumptions underlying OLS regression include (1) the dependent variable is a linear function of the explanatory variables, (2) explanatory variables are uncorrelated with each other, (3) error terms are normally distributed with a mean of zero and an equal variance. Based in part upon these assumptions, several things can go wrong and should be considered in regression diagnostics.

- The model may be misspecified (the dependent variable may be a nonlinear function of the explanatory variable).
- A relevant explanatory variable may be excluded from the model.
- An irrelevant explanatory variable may be included in the model.
- Multicollinearity may be present.
- Heteroscedasticity may present (error terms do not have an equal

variance).

-Some observations may be outliers, exerting an extremely disproportionate influence on the results.

In the main, a researcher must rely on theory to decide whether nonlinearity, excluded relevant variables, or included irrelevant variables is a problem. A low R-square value (the variation in the explanatory variables explains very little of the variation of the dependent variable) does however signal the possibility that a relevant variable has been excluded. An included variable which is not significant may be an irrelevant variable, but may instead be valid overall while not appearing to be significant in a given study.

Multicollinearity can be detected in several ways, one of which is the variance inflation factor (VIF). The VIF for an explanatory variable is computed by first obtaining an R-square value by regressing that variable on other explanatory variables, giving the amount of variation in the variable that is explained by the variation in the other variables. Then the R-square is subtracted from one, giving the amount of variation unique to the variable. The VIF value is computed by dividing this value into one (VIF = 1/unexplained variation). The higher the collinearity, the lower the unexplained variation value will be, so a large VIF value indicates a collinearity problem.

Heteroscedasticity is detected by plotting the residuals (the observed values of the dependent variable minus the predicted values) against each of the explanatory variables. The ideal result would be a set of points in the shape of a cylinder. A cone-shaped distribution indicates heteroscedasticity (errors have a larger variance for either low or high values of the explanatory variable).

Because the OLS procedure minimizes squared deviations, individual observations which are outliers (having a highly atypical value for either the

dependent variable, or explanatory variable, or both) can be highly influential in determining parameter estimates and significance levels. The Cook's Distance (Cook's D) statistic provides a measure of the overall influence of an observation because it measures the effect of the observation in both the X (leverage) and the Y (influence) directions. Higher values mean a larger influence.

The single-equation regression model used in this research to test for the expected direct relationship between agricultural export dependence and income probably has each of the problem conditions listed above present to some degree. Fortunately, the model is used only to indicate support for or against the hypothesis, not to explain the mechanism by which agricultural-export fluctuations affect county economies and not to predict an increase in income instability for a given increase in agricultural export dependence. Either of these objectives would require a more sophisticated model.

The structure of the model ignores linkages between counties and assumes that the linkages among the sectors are not sufficient to cause a multicollinearity problem. The model is an extreme simplification of a complex process, so it is likely that "relevant variables" have been excluded. However, attempts to operationally measure possible variables (such as economic agglomeration) were unsuccessful.

Multicollinearity is present in this regression model. Variance inflation factors range from a little over 1.0 (zero collinearity) to about 3.0 (the standard error of the parameter estimate is three times the size it would be in the absence of collinearity).

Collinearity was brought within an acceptable range chiefly because construction earnings and earnings for the finance, insurance, and real estate sector were excluded from the model. These sectors had a mass of values in the

5-10 percent range.

The model also has some heteroscedasticity of the error terms. For the most part, this is caused by some explanatory variables having a large concentration of values in the 5-20 percent range combined with a few higher values. Mining dependence, manufacturing dependence, and government dependence combine a large number of low values with a few higher values, and error plots are cone-shaped.

Two observations (Haskell county and Coffey county) exerted a high relative influence on the results, although both Cook's D statistic values were less than one. Typical values ranged from .03 to .05. Omitting Haskell county from the regression model increased the significance of several parameters, notably the coefficient for farming dependence. Both observations were retained in the analysis, because the Cook's D statistic was within the acceptable range for each.

Previous models analyzed included a model with the variables considered in this research but lacking a weather proxy. In this model, non-export farming dependence was significant. An earlier model used a population variable to control for the effects of the size of the county economy. (The dependent variable was expressed in terms of the standard deviation of the level of county income, not the percentage). This model was unsatisfactory due to multicollinearity, probably mostly between farm dependence and population. (Farm-dependent counties tend to be small, "non-farm" dependent counties large, in population).

Because the data base used in this analysis contained data suppressions, the dependence percentages for some counties did not sum to 100. The missing percentages were computed where possible using the unrevised data from the published *Local Area Personal Income* series (In frequent instances, data which was suppressed on the computer tape was not supressed in published sources).

This procedure introduces some bias into the model (the dependence ratios for a few counties summed to 101 or 102 percent), but failing to account for earnings would result in greater distortion. A suppressed sector would have a percentage ratio of zero.

Recommendations For Further Research

Improved extensions of this research would probably entail removing limitations or expanding the scope of the study. For example, input-output analysis could be used to gain a more detailed picture of forward and backward linkages. Instead of limiting the study to counties within state boundaries, agricultural-dependent areas which extend across state borders (parts of western Kansas and eastern Colorado, for example) could be examined.

The database used in this analysis contains data suppressions and extends only from 1969 to 1986. An unsuppressed data set would permit better insight into the actual magnitude of manufacturing dependence in farming-dependent counties. The number of manufacturing firms in these counties is sometimes so few that disclosure rules prevent the Bureau of Economic Analysis from releasing the data. Having data before 1969 or after 1986 was not crucial to this analysis, but county-level disaggregated income data for the 1960-68 period would have been useful as background information.

Improving the research by improving the analytical methods used is less straightforward than data-base related improvements, because an extremely complex model might fail to adequately distinguish sectors. An alternative to both this simplistic model and an extremely complex model would be a simultaneous-equation model which contained some social and political variables in addition to economic variables.

Expanding the scope of the study would improve the ability to generalize from the results. This research has Kansas as its primary focus, and no attempt has been made in this analysis to apply results obtained to other areas, but it is likely that states similar in terms of distribution of farming dependence (Nebraska and North Dakota, for example) have similar patterns of income instability and economic performance.

VI: IMPLICATIONS: INCOME INSTABILITY AND COUNTY COUNTY PERFORMANCE

Among Kansas counties, a higher-than-average agricultural export dependence is clearly associated with higher-than-average percentage fluctuations of real county total personal income. If, however, these specialized counties also tend to have higher-than-average growth rates of income, employment, and population, then relatively higher instability can be viewed as an acceptable cost of achieving relatively better economic performance. Unfortunately for the economic development prospects of many Kansas counties, counties with income instability higher than the state average (including all ag-export dependent and most non-export farming dependent counties) tend to have relatively slower growth votes for the 1969-1986 period. For these counties, income instability has exacerbated an already adverse economic development situation.

County Comparisons

Tables VI-1 through VI-5 show Kansas counties ranked by income instability as measured by the standard deviation of year-to-year percentage changes in real county total personal income 1969-1986. Also shown is the percentage change in total personal income, total full- and part-time employment, and population, from the 1969-71 average to the 1984-86 average.

Relative to counties ranking lower in terms of income instability and relative to overall state, metropolitan, and nonmetropolitan growth rates, high-instability counties recorded smaller increases. The Kansas increases were 50.6 percent for income, 36.0 percent for employment, and a 9.2 percent population increase. Metropolitan counties recorded respective increases of 58.4 percent, 51.2

percent, and 13.8 percent, all above the nonmetropolitan averages of 41.9, 22.1, and 4.8 percent.

The 21 counties included in the upper income instability quintile all had income standard deviations more than 20 percent higher than the state 1969-86 income deviation value of 10.13. As a group, these counties recorded a 28.04 percent increase in employment, and a 4.0 percent decline in population. Most of these counties are ag-export dependent with small populations (Jewell county, average 1978-82 population of 5,250, is the largest).

The upper-middle income instability quintile as a group includes a larger number of people (122,775 versus 73,550), even though no county has a population over 10,000 (Coffey, population 9,100, is the largest). Income instability values for these counties are all above the state average.

The upper-middle quintile enjoyed better economic performance than the top quintile, but most counties did worse than the state, metro, or nonmetro average. For the group, income increased 33.02 percent, employment increased 10.36 percent, and population increased by an average of 12.01 percent. The average population increase (larger than the state average) is highly influenced by a 26 percent increase in Coffey county and a 19 percent increase in Gray county.

TABLE VI-1: ECONOMIC PERFORMANCE OF KANSAS COUNTIES, UPPER INCOME-INSTABILITY QUINTILE

Rank	Name	Income	Employment	Population
		- - Percent Increase 1969-1986 - -		
1	Haskell	8.20	10.23	7.33
2	Stanton	25.55	6.71	5.88
3	Greeley	21.95	21.68	1.88
4	Sheridan	-1.76	9.64	-10.61
5	Hodgeman	-8.14	-11.70	-13.75
6	Wichita	4.70	-9.89	-11.22
7	Chase	21.84	-1.72	-6.79
8	Wallace	20.64	-5.84	-10.60
9	Lane	11.48	5.95	-7.40
10	Decatur	90.95	10.64	-9.45
11	Meade	11.57	-7.02	-3.44
12	Morton	65.72	26.75	-1.86
13	Trego	25.83	0.82	-4.51
14	Stevens	91.11	39.07	16.93
15	Comanche	-1.04	3.00	-6.17
16	Ness	56.26	10.47	-3.49
17	Kearny	67.15	23.21	25.00
18	Jewell	9.46	-8.54	-20.44
19	Gove	7.90	13.23	-7.69
20	Hamilton	36.66	16.02	-8.53
21	Rush	22.84	-7.33	-15.13

(Source: *Local Area Personal Income* series 1969-1986, Bureau of Economic Analysis, U. S. Dept. of Commerce).

TABLE VI-2: ECONOMIC PERFORMANCE OF KANSAS COUNTIES,

UPPER-MIDDLE INCOME-INSTABILITY QUINTILE

Rank	Name	Income	Employment	Population
		- - Percent increase 1969-1986 - -		
22	Edwards	40.97	-0.88	-10.94
23	Gray	22.06	22.98	19.40
24	Coffey	121.14	96.88	26.00
25	Logan	29.57	5.68	-12.38
26	Linn	59.19	23.59	5.55
27	Washington	18.01	-1.29	-14.96
28	Graham	22.87	22.94	-12.85
29	Lincoln	26.82	-9.57	-16.17
30	Scott	34.48	11.29	5.42
31	Cheyenne	20.27	6.83	-12.80
32	Grant	31.19	24.80	14.52
33	Woodson	3.75	-0.62	-6.94
34	Clark	18.02	-4.67	-5.88
35	Rawlins	30.58	4.07	-11.53
36	Harper	24.12	6.12	-1.70
37	Mitchell	20.35	11.70	-1.67
38	Republic	17.06	-9.91	-14.62
39	Kiowa	40.89	3.03	-1.68
40	Anderson	55.40	3.64	-0.39
41	Stafford	39.49	1.05	-3.37
42	Smith	17.17	0.03	-16.91

(Source: *Local Area Personal Income* series 1969-1986, Bureau of Economic Analysis, U. S. Dept. of Commerce).

TABLE VI-3: ECONOMIC PERFORMANCE OF KANSAS COUNTIES,

MIDDLE

INCOME-INSTABILITY QUINTILE

Rank	Name	Income	Employment	Population
		- - Percent Increase 1969-1986 - -		
43	Sherman	34.32	16.52	-3.91
44	Nemaha	43.57	28.78	-6.78
45	Osborne	9.85	-9.66	-11.70
46	Marshall	38.97	10.24	-3.54
47	Elk	35.01	19.30	-3.50
48	Pawnee	19.49	-0.62	-7.81
49	Thomas	66.70	27.25	16.44
50	Allen	44.20	33.01	5.51
51	Ottawa	33.94	8.15	-5.91
52	Finney	99.21	125.06	56.04
53	Pratt	44.03	27.23	8.97
54	Kingman	31.71	10.38	1.88
55	Russell	46.08	38.46	-5.00
56	Ellsworth	39.23	3.26	2.68
57	Norton	35.72	5.01	-10.64
58	Brown	30.72	13.62	-1.98
59	Clay	36.62	12.57	-5.03
60	Cloud	26.79	-0.44	-10.27
61	Phillips	31.57	8.13	-9.78
62	Seward	65.17	56.33	16.28
63	Morris	43.09	6.91	-1.04

(Source: *Local Area Personal Income* series 1969-1986, Bureau of Economic Analysis, U. S. Dept. of Commerce).

TABLE VI-4: ECONOMIC PERFORMANCE OF KANSAS COUNTIES, LOWER-MIDDLE INCOME-INSTABILITY QUINTILE

Rank	Name	Income	Employment	Population
		- - Percent increase 1969-1986 - -		
64	Sumner	56.31	20.44	8.58
65	Rice	31.61	11.48	-8.08
66	Rooks	17.35	6.90	-8.81
67	Wabaunsee	43.69	7.35	5.18
68	Barber	36.73	20.91	1.44
69	Marion	43.81	10.20	-4.78
70	Jackson	54.80	29.25	11.82
71	Osage	63.38	21.41	17.66
72	Chautauqua	27.57	33.22	23.59
73	Pottawatomie	88.58	71.08	33.05
74	Cherokee	43.07	11.36	3.24
75	Jefferson	70.95	37.18	32.77
76	Doniphan	25.75	15.61	-0.72
77	Dickinson	43.80	10.34	-0.83
78	Barton	44.38	42.37	7.15
79	Geary	4.86	-9.09	11.16
80	Franklin	52.01	29.30	11.01
81	Miami	60.16	30.51	16.17
82	Ford	56.06	44.57	16.14
83	Greenwood	14.12	6.66	-6.96
84	Wilson	28.39	22.26	5.37

(Source: *Local Area Personal Income* series 1969-1986, Bureau of Economic Analysis, U. S. Dept. of Commerce).

TABLE VI-5: ECONOMIC PERFORMANCE OF KANSAS COUNTIES, LOWER INCOME-INSTABILITY QUINTILE

Rank	Name	Income	Employment	Population
		- - Percent increase 1969-1986 - -		
85	Ellis	87.89	71.56	12.38
86	Atchison	24.38	-2.85	-6.57
87	Harvey	44.67	25.11	13.06
88	McPherson	58.10	44.89	11.69
89	Lyon	66.68	42.28	12.38
90	Labette	28.01	-2.04	0.13
91	Cowley	40.09	26.56	6.59
92	Neosho	37.59	26.24	1.94
93	Butler	68.32	39.44	24.08
94	Reno	43.62	18.88	6.95
95	Montgomery	33.88	17.90	3.99
96	Leavenworth	55.04	26.20	12.13
97	Sedgwick	57.86	42.32	11.13
98	Saline	58.13	38.29	7.57
99	Bourbon	56.34	65.07	3.28
100	Johnson	91.76	161.01	39.84
101	Douglas	67.02	56.90	22.49
102	Shawnee	43.42	24.62	2.96
103	Crawford	44.59	15.02	-0.87
104	Wyandotte	12.78	12.87	-7.17
105	Riley	30.38	45.36	15.53

(Source: *Local Area Personal Income* series 1969-1986, Bureau of Economic Analysis, U. S. Dept. of Commerce).

Counties slightly above or below the state income instability average, in the middle quintiles, accounted for 212,325 people of a 2,369,975 state total (average for 1978, 1979, 1981, and 1982). Counties were more heterogeneous in terms of population, ranging from 3,975 (Elk) to 24,550 (Finney). Income and employment growth group percentages were 40.71 and 20.93, both substantially higher than those recorded in the upper two quintiles. As a group, the middle quintile recorded little population growth (a 0.9 percent increase), with individual county percentages ranging from -11.7 percent (Osborne) to 56.0 percent (Finney).

Income instability values for the lower-middle income instability quintile ranged from 4.5 percent to 7.1 percent, all over 20 percent below the state average. Counties range in size from 5,100 (Chautauqua) to 31,925 population (Barton). Group means for income growth (44.10) and employment growth (22.54) were slightly above the group averages for the middle quintile. Poor economic performance in Geary county (4.8 percent increase in income, 9.0 percent decline in employment) pulled down the group average. Median values showed more of a performance difference: income- 43 versus 36 percent, employment- 31 versus 12 percent growth.

The bottom income instability quintile includes the large metropolitan counties (Shawnee, Johnson, Sedgwick, Wyandotte), most of the other other metro counties, and several manufacturing-dependent or government-dependent counties. No ag-export or non-export farming dependent counties are represented.

TABLE VI-6: AVERAGE ECONOMIC PERFORMANCE OF ECONOMIC DEPENDENCE GROUPS, 1969-71 to 1984-86

Group	No. of Cnties	Total Income	Total Emplt	Popu-lation	Per cap Income
			- - Percentage Increase- -		
Kansas	105	39.20	19.69	2.00	36.58
Metropolitan	9	55.67	46.55	14.97	35.10
Nonmetropolitan	96	37.66	17.17	0.79	36.71
Farming-Dependent	35	27.47	5.50	-4.76	34.21
Export	15	19.89	6.47	-3.98	25.27
Non-export	23	33.91	5.71	-4.66	40.57
Manufacturing-Dependent	13	40.58	23.97	4.84	33.80
Nonmetro Mfg-Dep	11	41.54	23.31	5.36	34.17
Government-Dependent	5	29.78	20.87	13.65	23.59
Nonmetro Govt-Dep	4	23.46	16.05	0.81	24.79
Diversified	14	43.39	27.87	6.82	34.71
Unclassified	32	46.73	23.29	2.65	42.69

(Note: Percentage increases shown are the means of individual county percentages for the groups).

Income, employment, and population growth rates for the most stable quintile were much higher than for the top quintile. Average income growth was 50.03 percent, compared to 28.04 percent for the upper quintile. Mean employment growth was 37.89 percent, five times average employment growth for the most unstable quintile (6.75 percent). Population growth averaged 9.22 percent compared to a 4.0 percent decline for the most unstable quintile.

In part because of population declines in high income-instability counties, economic performance comparisons show less of a gap between high and low instability quintiles when income growth is computed on a per capita basis. The 1969-86 increase in per capita income was 33.31 percent for the top instability quintile.

Per capita figures are not strictly comparable, however. For the upper income instability quintile, dividends, interest, and rent increased 143.0 percent, compared to 98.3 percent for the lower quintile. Per capita wage and salary disbursements increased 20.9 percent for the upper and 27.4 percents for the lower quintile.

Group Comparisons

Comparing economic performance across economic dependence groups such as ag-export dependent, non-export farming dependent, manufacturing-dependent, and government-dependent counties, ag-export dependent counties exhibited the lowest average income growth (Table VI-6). Even on a per capita basis, income growth was low in this group (25.27 percent, much lower than the Kansas and nonmetropolitan average, and similar to the low figure recorded by the government-dependent group).

Average employment and population increases for ag-export dependent

counties were similar to those for non-export farming-dependent counties. Total employment increased 6.47 percent for the ag-export, and 5.71 percent for the non-export group. These figures were lower than those recorded for other groups and were approximately one-third the size of the overall state increase. Population declined by an average of approximately four percent for both groups. No other groups recorded an average loss in population.

Non-export farming dependent counties as a group were second to ag-export dependent counties in terms of income instability (a 1969-86 real income standard deviation average of 13.93 versus an average of 20.13 for the ag-export group). Non-export farming dependent counties, as seen above, fared worse than other groups in terms of employment and population growth, but recorded total and per capita income percentage increases which were similar to those for other groups. On a per capita basis, income increased by a larger percentage than in manufacturing-dependent or all metropolitan counties (the low income-instability groups).

Despite similarities in per capita income growth, economic performance in counties dependent on nonfarm sectors was better overall than in farming-dependent counties, because these counties gained a much larger number of people (population) including a much larger number of people with jobs (employment). Employment in manufacturing-dependent counties increased an average of 23.97 percent, population 4.84 percent. Increases for government-dependent counties were also higher than those for the farming-dependent group, although excluding Leavenworth county from the government-dependent group lowers mean population growth to a figure near the overall nonmetropolitan average (Table VI-6).

The group of metropolitan counties includes Leavenworth from the

government-dependent and Sedgwick and Wyandotte from the manufacturing-dependent group, as well as counties with relatively large and diverse nonfarm sectors such as Douglas, Johnson, and Shawnee. They as a group exhibit very low farm sector dependence, very low income instability, and very high economic performance, compared to the ag-export dependent group.

VII. CONCLUSIONS

Kansas counties which are relatively more dependent on the agricultural export market as an income source also show a relatively higher instability of real county total personal income for the 1969-86 period. Approximately 15 Kansas counties can be considered to be agricultural-export dependent, meaning that the production of major export commodities (wheat, corn, grain sorghum, and soybeans) accounts for an important percentage of total earnings.

Agricultural export dependence is present at lower levels in many other Kansas counties, mainly among the 23 counties which can be considered to be dependent on farming, but not on agricultural exports. This subgroup of counties had a lower income instability than ag-export dependent counties, but significantly higher average group instability than counties designated as being dependent on nonfarm sectors such as manufacturing or government. This instability may be a result of agricultural export dependence being present at lower but still influential levels. (Regression analysis showed a highly significant relationship between export dependence and income instability but failed to show a significant relationship between "non-export" farming dependence and income instability, although this result was in part due to the influence of Haskell county on the regression results (Haskell county combines high export dependence and low "non-export" farming dependence with the highest observed income instability).

These findings indicate that approximately one-third of Kansas counties are significantly linked to and therefore affected by the international market for agricultural commodities. International market fluctuations, positive and negative, have been reflected in county-level income instability.

Located mostly in the western half of Kansas, agricultural export-linked counties tend to have county populations under 10,000. Still, even with recent population declines, over 150,000 people reside in areas in which the production of agricultural export commodities is an important part of the local economy.

It has not been the case that agricultural export-linked counties have sacrificed stability to achieve robust economic growth and development. They have instead experienced instability in combination with lackluster economic performance. These counties have lagged behind nonfarm-dependent counties in terms of 1969-86 income, employment, and population growth.

The economic fortunes of Kansas agricultural export-linked counties are likely to remain dependent on the international agricultural market. In the presence of a profitable, albeit volatile, market situation, these counties have uncertain but significant economic development prospects. Without such an export market, they face near-certain economic stagnation.

Without a strong export demand for wheat, feed grains and soybeans, Kansas agriculture cannot operate profitably at full capacity. Kansas therefore has a strong local stake in the success of international negotiations to expand total international agricultural trade and to improve the U.S. position in the international market. For many communities in Kansas, local economic success in the coming decade will be closely tied to global circumstances and events.

VIII: SUMMARY

Since 1971, U.S. agriculture has become strongly linked to the international market for agricultural commodities. Market prices for U.S. wheat, feed grains and soybeans are determined not simply by domestic supply and demand but by a complex interaction of production and demand in importing and exporting nations, exchange rates, and trade policies. Potentially, the international agricultural market is highly variable, prone to fluctuations in the overall volume and value of trade.

During the 1970's and 1980's, the international agricultural market has realized its instability potential, from the U.S. perspective. Volume and value of U.S. exports of most agricultural commodities have been subject to large year-to-year fluctuations. This instability has contributed to farm income fluctuations much larger than during the 1950's and 1960's.

Related research indicates that export-induced farm-income instability is more of a problem in those areas with specialized, export-oriented agricultural economies. Studies have used county-level data to distinguish between farming-dependent or agricultural-export dependent areas and areas dependent on nonfarm sectors.

In an agricultural-export dependent county, the nonfarm sector is smaller than in counties not dependent on farming and the farm sector is more vulnerable to export market fluctuations than in "non-export" farming-dependent counties. If the relationship between agricultural-export dependence is direct and the nonfarm sector is an insufficient stabilizing influence in counties with a high dependence on agricultural exports, then agricultural-export dependent counties as a group can be expected to have a higher average level of instability of total county income. If,

within farming-dependent counties, farm income tends to be more unstable in agricultural-export dependent counties than in "non-export" farming dependent counties, then agricultural-export dependent counties can also be expected to have a higher average level of income instability than the non-export group.

This research is an examination of patterns of income instability and economic dependence patterns in Kansas, using the 105 counties to define economic subregions. Income instability over the 1969-86 period is examined in relation to economic structure circa 1980. The purpose of this research is to compare average income instability in agricultural-export dependent counties to income instability experienced by other economic dependence groups. In addition, agricultural-export dependence is compared to other types of dependence such as non-export farming dependence, manufacturing dependence, and government dependence to assess the relative strength of the agricultural-export dependence/income instability relationship.

For income instability comparisons, the 105 Kansas counties were divided into seven groups: the nine metropolitan counties, 15 agricultural-export dependent counties, 23 non-export farming dependent counties, 11 manufacturing-dependent counties, 4 government-dependent counties, 13 diversified counties, 30 counties not included in the other six groups. Respective group instability averages (the mean of the county 1969-86 income standard deviation values) were 3.1, 20.1, 13.9, 4.5, 6.9, 7.9, and 7.7.

Observed differences were tested, using a least-squares, one-way analysis of variance (ANOVA) procedure, testing for each pairwise combination of groups the hypothesis that the means of the two groups are equal. The mean of the agricultural-export group was significantly different from the means of each other group, at a 0.01 alpha-level. The group mean for non-export farming dependent

counties was also significantly different from each other mean, at the 0.01 alpha-level. Other pairwise combinations with significantly different means at the 0.01 alpha-level were diversified/metropolitan and other nonmetro/metropolitan. Means of two pairs of groups were significantly different at the 0.05 alpha-level: manufacturing/diversified and manufacturing/other nonmetro.

Group mean comparison results indicate that Kansas agricultural-export dependent counties experienced a higher average level of income instability during the 1969-86 period relative to other dependence groups. The group of counties comprised of farming-dependent counties minus the 12 Kansas counties also classified as agricultural-export dependent experienced the second-highest average income instability.

Regression results also indicate a strong association between agricultural export dependence and income instability. Testing the relationship for all 105 counties and for the 96 nonmetropolitan counties showed a direct and significant relationship, both with highly influential observations included and with highly influential observations removed. "Non-export" farming dependence showed a positive but not significant relationship in both the 105-county and 96-county regressions, but showed a positive and significant relationship with Haskell county removed (both the 109-county and the 95-county regressions).

Agricultural-export dependent counties not only experienced a relatively high income instability but also relatively poor economic performance. Total employment increased an average of 6.47 percent and population declined an average of 3.98 percent (1969-71 average to 1984-86 average). Both percentages were substantially lower than for nonfarm dependent groups and overall nonmetro and Kansas growth but slightly above non-export farming-dependent group averages. Real total income growth was the lowest of all county groupings. (On a

per capita basis, income growth was similar to the average for government-dependent counties, and substantially below remaining groupings).

In agricultural-export dependent counties and in many other Kansas counties to a lesser extent, export-induced income instability is part of a generally difficult economic development situation. Agricultural export dependence is a part of and a destabilizing influence on the farm sector, contributing to farm-income instability in most farming-dependent counties. These agricultural-export linked counties tend to be located in western Kansas in contiguous groups, so the limited economic development prospects within these counties tend not to be balanced by a better economic development situation in adjacent counties.

ENDNOTES

I. INTRODUCTION

1. *Economic Indicators of the Farm Sector, National Financial Summary 1987*, Economic Research Service, U.S. Dept. of Agriculture. pp. 14-18.

2. Sommer, Judith E., Mindy F. Petrulis, and Don A. Riemund. *What's Ahead for Farm Areas Specializing in Export Crops?*, U.S. Dept. of Agriculture, June 1988, p.19.

II. RELATED RESEARCH: FARM INCOME INSTABILITY AND RURAL DEVELOPMENT

1. Ponsard Claude. *History of Spatial Economic Theory.* pp. 12-14. Berlin, FRG. Springer Verlag, 1983.

2. IBID, pp. 25-27.

3. Hoover, Edgar M. *An Introduction to Regional Economics.* pp. 138-142. New York, New York. Alfred A. Knopf, Inc., 1975.

4. Tweeten, Luther G. *Foundations of Farm Policy.* pp. 202, 204. Lincoln, Neb: University of Nebraska Press, 1979.

5. Paarlberg, Don. *Farm and Food Policy Issues for the 1980's.* p.5. Lincoln, Neb: University of Nebraska Press. 1980.

6. Ahearn, Mary, Susan Bentley, and Thomas Carlin. *Farming-Dependent Counties and the Financial Well-being of Farm Operator Households*, p. 2. Economic Research Service, U.S. Dept. of Agriculture, 1988.

7. IBID, p.4.

8. IBID, pp. 9-13.

9. Petrulis, Mindy, Bernal L. Green, Fred Hines, Richard Nolan, Judith Sommer. *How is Farm Financial Stress Affecting Rural America?* p. 7. Economic Research Service. U.S. Dept. of Agriculture, 1987.

10. Sommer, Judith E. and Fred K. Hines. *The U.S. Farm Sector: How Agricultural Exports are Shaping Rural Economies in the 1980s,*. p.9. Economic Research Service. U.S. Dept. of Agriculture, 1988.

11. IBID, P. 13.

12. IBID, P. 12.

III. DATA AND METHODS

1. U.S. Dept. of Commerce. . *Local Area Personal Income 1981-86, Vol. 1*, pp. 5-15.

2. Sommer and Hines, p.4.

BIBLIOGRAPHY

Ahearn, Mary, Susan Bentley, and Thomas Carlin. *Farming-Dependent Counties and the Financial Well-being of Farm Operator Households.* Economic Research Service, U.S. Dept. of Agriculture, 1988.

Ahearn, Mary, Jim Johnson and Roger Strickland. "The Distribution of Income and Wealth of Farm Operator Households," *Am. J. of Ag. Econ.* 67 (1985): 1087-1094.

Amstutz, Daniel G. "International Impact of U.S. Domestic Farm Policy." *Am. J. of Ag. Econ.* 66 (1984): 728-734.

Barkema, Alan and Mark Drabenstott. "Can U.S and Great Plains Agriculture Compete in the World Market?", *Economic Review, Federal Reserve Bank of Kansas City*, February 1988: 3-17.

Batten, Dallas S. and Michael J. Belongia. "Monetary Rules, and U.S. Agricultural Exports," *Am J. of Ag. Econ.* 68 (1986): 422-427.

Beale, Calvin L. "The Population Turnaround in Rural Small-Town America," in *Rural Policy Problems: Changing Dimensions*, William P. Browne and Don F. Hadwiger, eds. Lexington Mass: Lexington Books, 1982. pp. 47-59.

Bender, Lloyd D., Bernal L. Green, Thomas F. Hady, John A. Kuehn, Marlys K. Nelson, Leon B. Perkinson, Peggy J. Tuss. *The Diverse Social and Economic Structure of Non-metropolitan America.* Economic Research Service, U.S. Dept. of Agriculture, 1985.

Bloomquist, Leonard E. "Rural Manufacturing Gets Mixed Reviews," *Rural Development Perspectives*, U.S. Dept. of Agriculture, June 1988:22-30.

Ginder, Roger G., Kenneth F. Stone, and Daniel Otto. "Impact of the Farm Financial Crisis on Agribusiness Firms and Rural Communities," *Am. J. of Ag. Econ.* 67 (1985): 1184-1190.

Harrington, David. *The U.S. Farm Sector: How is it Weathering the 1980's?* Economic Research Service, U.S. Dept. of Agriculture, 1987.

Henry, Mark, Mark Drabenstott. "A Changing Rural America," *Economic Review, Federal Reserve Bank of Kansas City*, July/August 1986: 23-40.

Henry, Mark, Mark Drabenstott and Lynn Gibson. "Rural Growth Slows Down," *Rural Development Perspectives*, U.S. Dept. of Agriculture, June 1987: 25-30.

Hillman, Jimmye S. "International Trade Environment for Food and Agriculture in the Late 1980's" *Am. J. of Ag. Econ.* 66 (1984): 567-571.

Hines, Fred K., Bernal L. Green and Mindy F. Petrulis. "Vulnerability to Farm Problems Varies by Region," *Rural Development Perspectives*, U.S. Dept. of

Agriculture, June 1986:10-13.

Hoover, Edgar M. *An Introduction to Regional Economics.* New York, New York. Alfred A. Knopf, Inc., 1975.

Hughes, Dean W., James W. Richardson and M. Edward Riser. "Effects of Sustained Financial Stress on the Financial Structure and Performance of the Farm Sector," *Am. J. of Ag. Econ.* 67 (1985): 1170-1185.

Kansas State Board of Agriculture. *The 69 Annual Report and Farm Facts, 1984,* and previous issues.

Killian, Molly S. and Thomas F. Hody. "What is the Payoff for Diversifying Rural Economies," *Rural Development Perspectives,* U.S. Department of Agriculture, February 1988:2-7.

Krider, Charles E. "Economic Outlook for Rural Counties," *Kansas Business Review,* Institute of Public Policy and Business Research, University of Kansas, Spring 1986: 14-18.

Krueger, Anne O. "Protectionism Exchange Rate Distortions, and Agricultural Trading Patterns" *Am. J. of Ag. Econ.* 65 (1983): 864-871.

Jahr, Dale. "Rural Concerns and the National Policy Environment," *Am. J. of Ag.Econ.* 70(1988):1078-1084.

Johnson, D. Gale. "World Agriculture, Commodity Policy, and Price Variability," *Am. J. of Ag. Econ.* 58 (1975): 823-828.

Johnson, D. Gale. "Domestic Agricultural Policy in an International Environment; Effects of other Countries Policies on the United States," *Am. J. of Ag. Econ.* 66 (1984): 735-744.

Jolly, Robert W., Arnold Paulsen, James D. Johnson, Kenneth H. Baum, Richard Prescott. "Incidence, Intensity, and Duration of Financial Stress among Farm Firms," *Am. J. of Ag. Econ.* 67 (1985): 1108-1115.

McGranahan, David. "Rural Workers at a Disadvantage in the Job Opportunities," *Rural Development Perspectives,* U.S. Dept. of Agriculture, June 1988:7-21.

Melichar, Emanuel and George D. Irwin. "Condition of Rural Financial Intermediaries," *Am. J. of Ag. Econ.,* 67 (1985): 1178-1183.

Miller, Thomas A. *Increasing World Market Fluctuations and U.S. Agriculture: A Summary of Implications.* Economic Research Service, U.S. Dept. of Agriculture, 1984.

Myers, Lester H., James Blaylock and R. Kelly White. "Domestic and Export Demand for U.S. Agricultural Products," *Am. J. of Ag. Econ.* 69 (1987): 443-447.

O'brien, Patrick M. "World Market Trends and Prospects: Implications for U.S. Agricultural Policy," in *Agriculture, Stability, and Growth: Toward a Cooperative Approach*, Charles E. Curry and William P. Nichols, eds. Port Washington, New York: Associated Faculty Press, 1984. pp.1-80.

Otto, Daniel M. "Economic Linkages between Agriculture and Other Sectors Within Rural America," *Am. J. of Ag Econ.* 68 (1986): 1175-1182.

Paarlberg, Don. *Farm and Food Policy: Issues of the 1980s.* Lincoln, Neb: University of Nebraska Press, 1980.

Paarlberg, Philip L. and Philip C. Abbot. "Oligopolistic Behavior by Public Agencies in International Trade: The World Wheat Market," *Am. J. of Ag. Econ.* 68 (1986): 528-542.

Penson, John B., Jr. and Bruce L. Gardner. "Implications of the Macroeconomic Outlook for Agriculture," *Am. J. of Ag. Econ.* 70 (1988): 1013-1021.

Petrulis, Mindy, Bernal L. Green, Fred Hines, Richard Nolan, Judith Sommer. *How is Farm Financial Stress Affecting Rural America?* Economic Research Service. U.S. Dept. of Agriculture, 1987.

Ponsard Claude. *History of Spatial Economic Theory.* Berlin, FRG. Springer Verlag, 1983.

Pope, C. Arden, an H.L. Goodwin, Jr. "Impacts of Consumptive Demand on Rural Land Values," p.752. *Am. J. of Ag. Econ.* 66(1984): 750-754.

Pulver, Glen C. and Glen R. Rogers. "Changes in Income Sources in Rural America," *Am. J. of Ag. Econ.* 68 (1986): 1181-1187.

Rausser, Gordon C., James A. Chalfant, H. Alan Love, Kostas G. Stamoulis. "Macroeconomic Linkages, Taxes, and Subsidies in the U.S. Agricultural Sector," *Am. J. of Ag. Econ.* 68 (1986): 399-412.

Redwood, Anthony and Charles Krider. *The Kansas Economic Development Study: Findings, Strategy and Recommendations.* Institute of Public Policy and Business Research, University of Kansas, 1986.

Ross, Peggy J. and Bernal L. Green. *Procedures for Developing a Policy-Oriented Classification of Nonmetropolitan Counties.* Economic Research Service, U.S. Dept. of Agriculture, 1985.

Sanderson, Fred H. "An Assessment of Global Demand for U.S. Agricultural Products to the Year 2000: Economic and Policy Dimensions," *Am. J. of Ag. Econ.* 66 (1984): 576-584.

Schmitz, Andrew, Dale Sigurdson and Otto Doering. "Domestic Form Policy and the Gains from Trade," *Am. J. of Ag. Econ.* 68 (1986): 820-826.

Schwartz, Nancy E. "The Consequences of a Floating Exchange Rate for the U.S.

Wheat Market," *Am. J. of Ag. Econ.* 68 (1986): 428-433.

Sommer, Judith E. and Fred K. Hines. *The U.S. Farm Sector: How Agricultural Exports are Shaping Rural Economies in the 1980s.* Economic Research Service. U.S. Dept. of Agriculture, 1988.

Sommer, Judith E., Mindy F. Petrulis, and Donn A. Riemund. *What's Ahead for Farm Areas Specializing in Export Crops?* U.S. Dept. of Agriculture, June 1988:17-21.

Tomek, William G. and Kenneth L. Robinson. *Agricultural Product Prices.* Ithaca, New York: Cornell University Press, 1981.

Tweeten, Luther G. *Foundations of Farm Policy.* Lincoln, Neb: University of Nebraska Press, 1979.

U.S. Dept. of Agriculture: *Agricultural Prices, 1985.*

Agricultural Statistics. 1987 and prior issues.

Foreign Agricultural Trade of the United States (*FATUS*), various issues.

Fatus, Fiscal Year 1987 Supplement.

Economic Indicators of the Farm Sector: National Financial Summary, 1987.

Economic Indicators of the Farm Sector State Financial Summary, 1987.

World Agriculture Supply and Demand Estimates, various issues.

U.S. Dept. of Commerce.

Local Area Personal Income 1981-86. Bureau of Economic Analysis, 1988.

APPENDIX: DATA REFERENCE

TABLE APP-1: REGRESSION MATRIX

Name	Income	Ag-exp Dep	Non-exp Fm D	Mining Dep	Manuf Dep	Retail Trde Dep
ALLEN	9.715	2.062	4.736	4.952	28.742	10.821
ANDERS	11.038	5.482	15.066	1.625	9.460	9.888
ATCHIS	4.477	1.842	4.593	0.897	33.506	8.770
BARBER	6.925	5.881	16.347	10.348	7.285	9.739
BARTON	4.937	1.721	2.049	18.944	12.642	11.598
BOURBO	2.588	1.132	1.910	5.504	10.786	9.051
BROWN	8.199	6.515	17.059	0.482	9.983	8.816
BUTLER	3.573	1.311	2.939	5.647	23.814	10.370
CHASE	21.339	5.226	20.950	0.892	4.602	9.707
CHAUTA	6.256	1.760	9.645	11.396	1.655	15.499
CHEROK	5.427	3.364	4.098	0.589	24.169	8.305
CHEYEN	12.470	19.841	-4.755	0.694	0.771	15.059
CLARK	12.134	9.184	30.337	2.307	0.400	8.778
CLAY	8.062	5.811	11.178	0.735	20.896	10.870
CLOUD	7.678	5.545	7.262	0.660	6.985	11.841
COFFEY	13.830	1.657	4.883	1.121	1.643	4.221
COMANC	16.479	10.156	27.848	3.374	2.964	9.946
COWLEY	3.954	1.334	1.335	3.211	30.575	9.745
CRAWFO	2.118	1.035	2.324	3.346	20.363	11.501
DECATU	18.566	8.484	35.220	6.703	1.457	8.336
DICKIN	5.225	4.652	2.949	1.193	12.837	15.469
DONIPH	5.264	6.611	14.970	0.747	10.042	7.060
DOUGLA	2.459	0.400	1.114	0.511	20.958	11.768
EDWARD	14.499	12.573	19.676	1.637	13.014	7.739
ELK	10.315	3.406	12.736	3.254	1.170	11.525
ELLIS	4.528	1.312	3.967	8.416	8.908	14.090
ELLSWO	8.859	6.480	11.766	5.974	15.031	7.221
FINNEY	9.221	3.586	4.791	2.159	15.405	11.738
FORD	4.605	2.863	4.946	0.713	14.592	13.730
FRANKL	4.755	1.664	7.422	1.982	25.156	11.144
GEARY	4.771	0.218	1.198	0.269	2.808	5.059
GOVE	15.419	10.631	29.106	1.787	7.535	7.456

(TABLE APP-1, cont.)

Name	Income	Ag-exp	Non-expt	Mining	Manuf	Retail Trade
GRAHAM	13.351	11.493	1.044	9.664	1.403	11.907
GRANT	12.325	5.715	15.995	6.310	10.576	8.196
GRAY	14.356	14.888	19.653	0.718	0.726	5.980
GREELE	28.055	19.939	36.775	0.690	1.263	4.282
GREENW	4.578	1.936	7.307	10.231	1.856	13.400
HAMILT	14.888	15.786	28.678	2.511	0.000	7.491
HARPER	11.214	12.701	15.311	4.230	6.177	10.875
HARVEY	4.254	1.673	4.930	0.742	27.501	7.639
HASKEL	37.085	20.552	10.169	3.135	0.642	5.725
HODGEM	23.101	22.091	23.789	2.815	0.000	5.060
JACKSO	6.633	4.165	3.664	0.493	7.314	14.070
JEFFER	5.314	3.799	9.454	0.805	2.536	10.537
JEWELL	16.172	14.742	19.417	0.212	10.418	6.516
JOHNSO	2.554	0.054	0.337	1.012	14.105	13.240
KEARNY	16.206	14.977	14.611	3.362	0.759	5.588
KINGMA	9.087	11.574	5.639	5.386	7.859	9.180
KIOWA	11.103	8.745	17.383	1.792	0.341	8.295
LABETT	4.073	1.558	0.748	1.338	26.089	9.765
LANE	18.742	16.228	16.537	0.000	0.398	6.950
LEAVEN	3.230	0.379	1.970	0.297	10.863	6.522
LINCOL	13.132	13.182	25.004	0.000	6.148	7.696
LINN	13.674	3.159	13.517	8.661	3.172	6.143
LOGAN	13.721	13.484	6.520	4.987	0.863	16.468
LYON	4.087	0.769	1.950	0.583	33.835	10.245
MCPHER	4.187	2.916	4.164	1.846	28.282	8.481
MARION	6.825	6.056	17.077	3.073	9.735	9.653
MARSHA	10.380	6.865	14.355	0.642	9.271	9.966
MEADE	17.872	10.794	25.886	2.492	0.865	6.462
MIAMI	4.754	1.518	3.536	1.720	14.270	9.276
MITCHE	11.149	9.507	2.890	0.324	10.297	12.356
MONTGO	3.351	0.586	1.603	6.115	34.380	10.562
MORRIS	7.279	6.372	7.833	1.284	7.399	12.925
MORTON	17.729	8.565	21.082	7.417	5.896	6.965
NEMAHA	10.750	5.563	13.022	0.632	15.024	10.395
NEOSHO	3.692	1.391	3.342	7.575	26.389	9.573
NESS	16.268	8.956	17.685	14.770	0.951	7.424
NORTON	8.238	7.036	8.541	0.842	2.987	12.396
OSAGE	6.408	4.167	8.834	1.424	10.774	13.459
OSBORN	10.687	11.091	11.475	1.897	8.578	11.379
OTTAWA	9.692	12.979	3.425	0.649	13.416	8.778

(TABLE APP-1, cont.)

Name	Income	Ag-exp	Non-expt	Mining	Manu-	Retail Trade
PAWNEE	10.169	7.853	12.864	1.590	2.906	10.014
PHILLI	7.495	5.330	11.289	3.951	21.280	7.858
POTTAW	5.756	2.010	7.380	0.389	16.249	8.857
PRATT	9.169	6.037	8.946	10.764	5.226	12.377
RAWLIN	11.277	17.877	14.281	1.612	1.299	9.553
RENO	3.396	1.532	3.336	1.095	28.037	14.784
REPUBL	11.132	10.107	15.328	0.327	4.668	10.408
RICE	7.074	6.521	6.844	14.515	9.749	8.106
RILEY	1.463	0.487	1.674	0.424	2.736	12.359
ROOKS	7.055	5.831	12.249	16.489	7.936	9.982
RUSH	14.691	11.440	21.614	1.269	9.832	7.423
RUSSEL	9.044	3.998	8.367	21.110	8.263	9.555
SALINE	2.591	0.871	0.447	0.407	21.391	12.897
SCOTT	12.673	9.820	7.991	1.986	5.978	10.257
SEDGWI	2.929	0.162	0.409	1.997	35.495	9.621
SEWARD	7.434	1.695	5.653	12.858	16.768	10.555
SHAWNE	2.343	0.114	0.457	0.516	14.551	9.248
SHERID	25.711	16.143	22.038	1.049	0.604	9.364
SHERMA	10.825	9.488	14.048	1.009	5.309	14.074
SMITH	10.851	12.144	12.903	0.452	4.071	8.494
STAFFO	10.903	11.255	28.470	4.530	2.421	6.457
STANTO	28.317	25.669	16.252	0.000	0.000	2.219
STEVEN	16.906	6.983	41.406	3.541	0.313	4.516
SUMNER	7.093	8.814	3.751	2.144	17.471	11.474
THOMAS	9.829	9.813	16.428	1.870	3.092	11.281
TREGO	16.968	9.434	21.164	3.870	2.032	11.221
WABAUN	7.051	5.587	12.211	1.139	3.134	14.941
WALLAC	20.375	17.194	24.987	0.000	1.300	7.183
WASHIN	13.430	10.788	23.052	0.469	1.921	10.589
WICHIT	21.609	13.259	34.259	0.670	1.924	8.321
WILSON	4.567	2.792	8.557	1.737	33.382	9.208
WOODSO	12.172	5.757	14.800	9.030	4.514	11.525
WYANDO	2.102	0.011	0.081	0.269	31.138	7.294

TABLE APP-2: REGRESSION MATRIX CONTINUATION

Name	Services Dep	Transfer Pymnts Dep	Govt Dep	Residual Dep	Wheat Yield Std Deviat	Ret/Ser Average Dep
ALLEN	12.259	18.353	16.298	11.653	5.271	11.540
ANDERS	13.618	17.182	18.641	13.492	7.329	11.753
ATCHIS	14.528	17.233	12.319	15.108	5.505	11.649
BARBER	8.955	15.177	11.321	20.945	5.287	9.347
BARTON	15.530	11.343	7.685	18.983	5.973	13.564
BOURBO	15.066	16.979	9.532	29.342	5.162	12.059
BROWN	18.304	18.888	14.004	15.232	7.251	13.560
BUTLER	15.263	12.292	12.383	12.896	5.990	12.816
CHASE	13.422	16.888	18.359	15.215	5.942	11.565
CHAUTA	19.508	22.357	14.865	13.284	7.036	17.504
CHEROK	10.951	19.996	15.058	26.408	5.976	9.628
CHEYEN	18.769	15.434	15.003	22.683	7.286	16.914
CLARK	9.162	17.409	19.664	12.214	5.908	8.970
CLAY	12.711	17.230	13.671	13.747	4.546	11.791
CLOUD	20.322	19.196	14.568	22.096	6.741	16.082
COFFEY	4.565	14.682	5.425	7.034	6.220	4.393
COMANC	9.463	16.409	14.121	12.025	6.063	9.704
COWLEY	17.451	16.398	16.248	10.594	6.398	13.598
CRAWFO	16.994	22.223	19.714	15.116	6.076	14.247
DECATU	12.137	13.231	9.151	10.161	7.022	10.236
DICKIN	15.090	18.011	14.723	22.338	5.236	15.280
DONIPH	8.840	17.282	14.423	29.416	7.432	7.950
DOUGLA	14.259	12.241	30.048	9.252	5.469	13.014
EDWARD	12.742	15.828	10.973	15.052	5.397	10.240
ELK	13.665	19.907	21.607	17.756	6.882	12.595
ELLIS	22.337	11.296	15.624	12.927	5.575	18.213
ELLSWO	17.208	15.469	13.365	12.046	7.122	12.214
FINNEY	17.632	9.207	10.558	16.473	6.858	14.685
FORD	16.495	11.950	12.004	22.423	6.389	15.113
FRANKL	13.796	16.535	14.499	14.003	6.369	12.470
GEARY	5.034	17.803	77.904	4.318	5.979	5.047
GOVE	7.916	13.396	14.591	13.680	7.794	7.686

(TABLE APP-2 Cont.)

Name	Services	Trans-	Govt	Resid-	Wheat	Ret/Ser
GRAHAM	14.007	14.777	20.672	13.624	6.124	12.957
GRANT	11.053	9.093	8.424	21.958	8.659	9.624
GRAY	7.569	10.356	9.757	22.328	7.579	6.774
GREELE	9.198	9.575	9.416	11.789	8.094	6.740
GREENW	17.355	19.424	13.613	18.956	6.424	15.377
HAMILT	9.994	15.596	17.350	11.156	6.540	8.742
HARPER	11.906	18.957	13.965	15.750	5.107	11.391
HARVEY	22.718	13.790	8.282	18.454	4.862	15.179
HASKEL	6.887	7.999	13.655	30.596	8.493	6.306
HODGEM	9.421	12.131	16.475	10.267	6.386	7.241
JACKSO	12.923	17.722	19.689	17.661	6.969	13.496
JEFFER	16.208	14.443	19.743	15.711	6.275	13.372
JEWELL	9.096	15.572	16.778	13.875	7.621	7.806
JOHNSO	22.927	6.869	9.877	21.144	6.502	18.083
KEARNY	8.644	9.074	15.084	29.494	5.871	7.116
KINGMA	13.671	15.970	14.169	19.223	4.024	11.425
KIOWA	13.716	14.088	12.219	27.171	5.491	11.005
LABETT	12.671	21.171	18.666	19.620	5.964	11.218
LANE	8.092	12.389	16.482	18.153	7.052	7.521
LEAVEN	9.684	16.232	57.658	5.122	5.159	8.103
LINCOL	11.697	17.931	16.813	8.470	6.119	9.696
LINN	7.905	17.888	10.623	33.404	7.342	7.024
LOGAN	12.756	13.924	16.499	18.006	7.503	14.612
LYON	12.182	13.078	15.883	17.133	5.763	11.214
MCPHER	15.727	11.985	8.532	15.262	5.103	12.104
MARION	19.674	16.779	13.719	11.268	4.568	14.663
MARSHA	12.302	18.184	10.848	24.932	5.897	11.134
MEADE	13.181	10.442	10.624	9.918	7.777	9.822
MIAMI	12.489	15.463	20.286	23.586	6.911	10.883
MITCHE	18.953	17.145	17.260	18.711	6.814	15.654
MONTGO	12.917	17.479	11.180	14.035	5.972	11.740
MORRIS	12.774	20.203	16.564	20.282	5.746	12.849
MORTON	3.995	9.925	13.123	25.861	7.688	5.480
NEMAHA	12.590	16.088	12.347	20.601	5.548	11.493
NEOSHO	10.613	16.526	13.696	17.199	6.651	10.093
NESS	11.371	12.675	14.964	13.208	6.719	9.398
NORTON	12.688	17.841	27.345	16.855	5.824	12.542
OSAGE	13.319	16.412	19.842	18.917	6.632	13.389
OSBORN	13.490	18.875	13.363	18.909	6.940	12.434
OTTAWA	15.200	18.276	16.717	15.848	6.114	11.989

(TABLE APP-2 Cont.)

Name	Services	Trans-	Govt	Resid-	Wheat	Ret/Ser
PAWNEE	13.574	15.343	32.429	9.155	5.087	11.794
PHILLI	13.106	15.137	12.645	16.605	5.403	10.482
POTTAW	9.529	14.234	11.468	17.868	6.278	9.193
PRATT	17.534	14.238	13.025	14.955	5.433	14.955
RAWLIN	13.983	15.386	16.357	13.083	7.405	11.768
RENO	15.745	12.820	10.571	14.205	4.320	15.264
REPUBL	14.753	16.351	14.285	17.059	7.051	12.581
RICE	12.864	17.258	11.618	21.139	4.349	10.485
RILEY	18.544	10.257	41.217	8.152	5.091	15.451
ROOKS	10.731	15.596	12.793	14.861	6.381	10.357
RUSH	6.808	15.205	15.349	16.792	6.880	7.115
RUSSEL	13.259	13.386	12.373	13.509	7.395	11.407
SALINE	23.616	13.036	10.686	18.278	6.004	18.257
SCOTT	16.545	10.933	9.901	26.824	6.536	13.401
SEDGWI	18.315	11.010	10.042	13.385	4.730	13.968
SEWARD	12.982	8.258	8.993	22.027	8.900	11.768
SHAWNE	19.983	14.675	20.954	20.723	6.314	14.616
SHERID	11.362	11.696	13.176	15.942	8.128	10.363
SHERMA	14.121	15.105	16.002	16.689	6.793	14.097
SMITH	17.361	17.326	12.822	23.231	6.154	12.927
STAFFO	10.735	15.674	14.603	14.437	4.693	8.596
STANTO	6.901	9.951	16.642	24.696	8.146	4.560
STEVEN	8.418	8.964	8.369	18.850	9.521	6.467
SUMNER	13.139	15.956	15.479	16.991	4.636	12.306
THOMAS	12.797	10.805	17.352	16.961	9.059	12.039
TREGO	16.095	15.051	11.802	14.338	6.158	13.658
WABAUN	20.771	18.161	18.874	9.252	5.914	17.856
WALLAC	5.656	11.053	10.520	19.250	7.678	6.419
WASHIN	12.402	17.926	16.676	14.960	5.659	11.495
WICHIT	6.630	9.935	9.281	16.787	8.869	7.476
WILSON	10.223	18.588	13.014	13.898	7.400	9.715
WOODSO	13.694	20.187	15.595	15.914	6.321	12.610
WYANDO	12.271	17.285	15.555	24.529	5.916	9.782

TABLE APP-3: OTHER DEPENDENCE RATIOS

Name	Farm Dep	Ag Serv, fstry fshrs	Whole-sale Trade Dep	Trans-porta-tion, Public Utilits	Con-struc-tion Dep	Finance Insrnce Real Estate Dep
ALLEN	6.799	0.179	5.021	6.454	5.130	3.345
ANDERS	20.548	0.621	4.706	8.165	8.103	4.625
ATCHIS	6.435	0.180	6.861	8.067	3.969	3.062
BARBER	22.228	4.550	6.531	9.864	5.276	3.903
BARTON	3.770	0.291	10.483	8.208	7.113	3.736
BOURBO	3.042	0.276	4.459	24.606	3.997	13.680
BROWN	23.573	0.512	5.947	8.773	5.692	3.913
BUTLER	4.250	0.545	5.760	6.591	11.454	3.923
CHASE	26.176	0.000	4.901	10.314	6.362	4.961
CHAUTA	11.405	0.881	3.046	9.357	8.426	3.962
CHEROK	7.462	0.595	3.606	22.207	4.181	2.876
CHEYEN	15.085	0.892	11.822	9.969	6.539	5.396
CLARK	39.520	0.720	4.203	7.290	3.709	4.073
CLAY	16.989	0.464	7.234	6.049	6.585	3.796
CLOUD	12.807	0.933	12.166	8.997	5.900	4.820
COFFEY	6.540	0.168	1.578	5.289	67.830	1.622
COMANC	38.004	0.871	4.896	6.259	6.494	3.609
COWLEY	2.669	0.809	2.630	7.155	6.680	2.826
CRAWFO	3.359	0.270	5.570	9.275	5.736	3.872
DECATU	43.704	0.866	5.607	3.689	4.230	4.122
DICKIN	7.602	1.013	6.988	14.337	6.241	4.506
DONIPH	21.582	0.649	21.910	6.857	4.400	3.490
DOUGLA	1.513	0.223	2.963	6.065	8.288	3.404
EDWARD	32.249	1.907	7.928	5.217	4.687	4.130
ELK	16.142	5.899	6.371	5.486	9.472	5.335
ELLIS	5.280	0.297	5.131	7.499	8.162	4.256
ELLSWO	18.246	0.535	5.690	5.821	7.261	3.648
FINNEY	8.377	0.976	7.379	8.117	13.846	3.811
FORD	7.809	1.088	8.342	12.992	7.923	4.311
FRANKL	9.087	0.368	7.584	6.052	6.580	3.754
GEARY	1.416	0.102	0.767	3.449	2.084	1.108
GOVE	39.737	1.360	7.633	4.687	5.179	2.816

(TABLE APP-3, Cont.)

Name	Farm	Ag Ser	Whole-	Trans-	Con-	Finance
GRAHAM	12.537	0.603	8.359	4.662	7.448	4.899
GRANT	21.710	0.960	7.477	13.521	9.470	2.303
GRAY	34.541	1.894	16.840	3.594	4.352	14.029
GREELE	56.713	0.662	6.716	4.411	4.208	2.440
GREENW	9.243	2.692	6.869	9.396	9.601	5.745
HAMILT	44.463	0.523	5.370	5.263	3.206	3.020
HARPER	28.012	1.031	8.002	6.717	4.902	4.184
HARVEY	6.602	0.416	4.744	13.294	4.750	3.311
HASKEL	30.722	6.360	10.725	13.512	5.384	3.254
HODGEM	45.880	3.518	4.011	2.738	3.586	3.592
JACKSO	7.829	1.107	8.824	7.729	11.541	8.479
JEFFER	13.253	1.294	2.262	12.155	11.314	5.041
JEWELL	34.159	2.110	6.595	5.170	5.321	3.595
JOHNSO	0.391	0.706	13.234	7.205	7.508	9.797
KEARNY	29.588	5.085	2.856	21.553	6.381	1.614
KINGMA	17.213	1.182	10.316	7.725	8.366	4.934
KIOWA	26.128	0.928	7.590	18.653	6.644	3.662
LABETT	2.306	0.392	3.961	15.267	5.833	3.714
LANE	32.765	0.000	9.679	8.474	5.243	4.276
LEAVEN	2.349	0.842	1.272	3.008	4.808	2.698
LINCOL	38.186	0.572	6.439	1.459	2.995	4.049
LINN	16.676	0.548	3.794	29.062	10.625	2.791
LOGAN	20.004	0.584	7.222	10.200	6.016	4.401
LYON	2.719	0.226	3.668	13.239	4.267	3.153
MCPHER	7.079	0.536	5.086	9.640	8.870	5.922
MARION	23.134	1.790	6.256	3.222	5.956	3.788
MARSHA	21.219	2.375	6.205	16.352	5.776	5.044
MEADE	36.680	0.225	6.469	3.225	6.197	3.011
MIAMI	5.054	0.464	4.264	18.858	9.743	3.575
MITCHE	12.397	1.631	12.895	4.185	4.643	5.059
MONTGO	2.189	0.292	3.555	10.188	5.508	3.112
MORRIS	14.205	2.499	4.975	12.808	9.645	4.922
MORTON	29.647	1.543	4.719	19.599	4.607	2.280
NEMAHA	18.585	2.847	6.720	11.034	6.239	3.588
NEOSHO	4.733	1.545	6.975	8.679	6.142	4.080
NESS	26.641	0.505	8.291	4.413	7.030	3.640
NORTON	15.577	0.842	4.980	11.033	5.834	5.476
OSAGE	13.001	0.689	5.027	13.201	5.040	4.224
OSBORN	22.566	1.194	11.767	5.948	4.354	5.464
OTTAWA	16.404	1.706	7.124	7.017	7.409	5.580

(TABLE APP-3, Cont.)

Name	Farm	Ag Ser	Whole-	Trans-	Con-	Finance
PAWNEE	20.717	0.726	4.979	3.450	4.955	4.661
PHILLI	16.619	0.617	4.949	11.039	4.242	3.695
POTTAW	9.390	0.628	4.064	13.176	23.994	2.256
PRATT	14.983	0.791	7.747	6.417	6.614	4.523
RAWLIN	32.159	1.987	8.343	2.753	5.812	6.141
RENO	4.868	0.378	7.266	6.561	6.283	4.413
REPUBL	25.435	1.534	7.187	8.338	8.776	4.288
RICE	13.365	0.540	4.962	15.637	5.125	3.520
RILEY	2.161	0.342	3.678	4.132	7.910	6.497
ROOKS	18.080	0.547	8.526	5.788	6.141	2.987
RUSH	33.054	0.931	9.838	6.023	4.197	5.276
RUSSEL	12.365	0.448	5.391	7.670	5.780	3.787
SALINE	1.318	0.283	9.632	8.363	7.257	4.149
SCOTT	17.812	2.793	12.037	11.994	7.392	3.306
SEDGWI	0.571	0.236	7.013	6.136	5.724	4.850
SEWARD	7.348	0.292	7.369	14.366	5.582	2.887
SHAWNE	0.571	0.247	6.914	13.562	6.230	7.224
SHERID	38.180	1.798	8.522	5.622	5.281	5.041
SHERMA	23.536	0.948	6.796	8.945	5.264	3.997
SMITH	25.047	1.130	18.729	3.372	4.105	4.417
STAFFO	39.725	0.799	8.886	4.752	3.343	3.750
STANTO	42.921	2.961	17.372	4.363	3.287	3.204
STEVEN	48.388	0.654	3.010	15.185	5.231	2.196
SUMNER	12.565	0.445	4.236	12.310	6.255	4.483
THOMAS	26.240	1.182	10.091	5.688	5.916	4.490
TREGO	30.598	0.622	5.504	8.212	5.779	4.263
WABAUN	17.797	1.729	5.400	2.123	7.719	6.373
WALLAC	42.182	1.127	2.545	15.578	3.638	2.410
WASHIN	33.840	0.979	6.978	7.003	5.476	3.668
WICHIT	47.518	1.433	11.678	3.677	4.339	4.530
WILSON	11.349	0.609	4.720	8.569	4.367	2.823
WOODSO	20.556	1.602	4.668	9.643	3.082	6.090
WYANDO	0.092	0.151	10.025	14.353	6.032	2.820

TABLE APP-4: ECONOMIC PERFORMANCE MEASURES AND COUNTY POPULATION

Name	Income	Employ-ment	Popu-lation	Per capita Income	Average Pop. 1978-79/ 1981-82
	percent increase	percent increase	percent increase	percent increase	
ALLEN	44.206	33.010	5.519	36.705	15750
ANDERS	55.408	3.643	-0.392	56.282	8650
ATCHIS	24.390	-2.857	-6.574	33.152	18350
BARBER	36.738	20.916	1.449	34.673	6725
BARTON	44.390	42.377	7.151	34.743	31925
BOURBO	56.347	65.079	3.282	51.383	15775
BROWN	30.723	13.620	-1.989	33.496	11825
BUTLER	68.325	39.446	24.087	35.611	44350
CHASE	21.841	-1.721	-6.796	31.041	3275
CHAUTA	27.571	33.224	3.597	23.165	5100
CHEROK	43.072	11.362	3.241	38.589	22100
CHEYEN	20.273	6.836	-12.800	37.833	3775
CLARK	18.025	-4.674	-5.882	25.011	2625
CLAY	36.624	12.573	-5.034	43.913	9700
CLOUD	26.793	-0.444	-10.276	41.259	12425
COFFEY	121.141	96.884	26.009	74.998	9100
COMANC	-1.042	-0.618	-6.173	5.542	2550
COWLEY	40.097	26.568	6.590	31.427	36275
CRAWFO	44.599	15.026	-0.873	45.919	37975
DECATU	90.950	10.642	-9.459	111.307	4600
DICKIN	43.803	10.349	-0.832	45.009	20475
DONIPH	25.750	15.611	-0.727	26.659	9200
DOUGLA	67.027	56.907	22.496	36.378	67725
EDWARD	40.970	-0.885	-10.949	58.386	4275
ELK	35.017	19.306	-3.509	39.902	3975
ELLIS	87.898	71.562	12.382	67.221	26350
ELLSWO	39.236	3.268	2.688	35.603	6650
FINNEY	99.213	125.068	56.042	27.680	24500
FORD	56.069	44.578	16.148	34.379	24475
FRANKL	52.011	29.301	11.018	36.942	21925
GEARY	4.864	-9.091	11.164	-5.977	30900
GOVE	7.908	13.233	-7.692	17.161	3700

(TABLE APP-4, Cont.)

Name	Income	Employ-	Popu-	PcI	Average
GRAHAM	22.877	22.940	-12.857	40.847	4075
GRANT	31.195	24.805	14.525	14.597	6850
GRAY	22.062	22.982	19.403	2.184	5150
GREELE	21.954	21.684	1.887	19.736	1875
GREENW	34.123	6.660	-6.960	44.183	8800
HAMILT	36.661	16.022	-8.537	49.280	2550
HARPER	24.127	6.129	-1.709	26.153	7775
HARVEY	44.679	25.117	13.065	27.977	30500
HASKEL	8.204	10.231	7.339	0.779	3925
HODGEM	-8.148	-11.703	-13.750	6.408	2300
JACKSO	54.804	29.258	11.821	38.452	11600
JEFFER	70.959	37.183	32.778	28.769	15175
JEWELL	9.469	-8.546	-20.442	37.615	5250
JOHNSO	91.763	161.015	39.848	37.046	269700
KEARNY	67.150	23.213	25.000	33.796	3550
KINGMA	31.710	10.382	1.887	29.261	9000
KIOWA	40.893	3.032	-1.681	43.455	4125
LABETT	28.017	-2.049	0.130	27.894	25700
LANE	11.483	5.950	-7.407	20.402	2575
LEAVEN	55.050	26.205	12.138	38.213	54625
LINCOL	26.828	-9.572	-16.176	51.263	4225
LINN	59.199	23.598	5.556	50.849	8250
LOGAN	29.578	5.684	-12.389	47.804	3525
LYON	66.680	42.289	12.384	48.560	35325
MCPHER	58.102	44.893	11.694	41.561	26950
MARION	43.813	10.202	-4.785	51.070	13600
MARSHA	38.972	10.248	-3.544	44.070	13025
MEADE	11.576	-7.028	-3.448	15.448	4775
MIAMI	60.167	30.515	16.179	37.883	21750
MITCHE	20.353	11.708	-1.674	22.364	8050
MONTGO	33.884	17.907	3.997	28.759	42375
MORRIS	43.094	6.917	-1.042	44.568	6425
MORTON	65.726	26.751	-1.869	68.851	3450
NEMAHA	43.572	28.783	-6.780	54.033	11225
NEOSHO	37.597	26.243	1.947	34.952	19350
NESS	56.263	10.479	-3.497	61.977	4550
NORTON	35.729	5.011	-10.648	51.774	6750
OSAGE	63.382	21.413	17.662	38.947	15225
OSBORN	9.857	-9.665	-11.702	24.264	5950
OTTAWA	33.948	8.152	-5.914	42.395	6000

(TABLE APP-4, Cont.)

Name	Income	Employ-	Popu-	PcI	Average
PAWNEE	19.491	-0.622	-7.813	29.798	8325
PHILLI	31.573	8.134	-9.787	45.821	7625
POTTAW	88.585	71.080	33.051	41.796	14875
PRATT	44.032	27.239	8.970	32.049	10400
RAWLIN	30.587	4.077	-11.538	47.294	4025
RENO	43.625	18.886	6.955	34.274	64550
REPUBL	17.064	-9.912	-14.625	37.123	7625
RICE	31.612	11.488	-8.086	43.226	11925
RILEY	30.386	45.363	15.588	12.555	63275
ROOKS	17.351	6.908	-8.811	28.660	7100
RUSH	22.844	-7.336	-15.132	44.588	4550
RUSSEL	46.085	38.466	-5.000	53.681	8900
SALINE	58.134	38.296	7.577	47.015	49175
SCOTT	34.480	11.299	5.422	27.513	5800
SEDGWI	57.863	42.322	11.139	42.032	368900
SEWARD	65.179	56.333	16.284	42.149	17600
SHAWNE	43.425	24.622	2.962	39.305	154850
SHERID	-1.760	9.649	-10.619	9.156	3575
SHERMA	34.328	16.524	-3.913	39.841	7775
SMITH	17.171	0.033	-16.915	40.956	5925
STAFFO	39.494	1.055	-3.371	44.190	5725
STANTO	25.553	6.715	5.882	18.443	2400
STEVEN	91.113	39.075	16.935	63.325	4675
SUMNER	56.314	20.449	8.584	43.906	24900
THOMAS	66.700	27.253	16.444	43.200	8500
TREGO	25.831	0.820	-4.511	31.692	4200
WABAUN	43.694	7.352	5.181	36.661	6750
WALLAC	20.641	-5.843	-10.606	35.120	2050
WASHIN	18.018	-1.291	-14.964	39.042	8575
WICHIT	4.707	-9.896	-11.224	17.847	3175
WILSON	28.390	22.261	5.373	21.736	12025
WOODSO	3.756	-0.625	-6.944	11.685	4650
WYANDO	12.782	12.870	-7.171	21.489	172800

AGRICULTURAL EXPORT DEPENDENCE AND INCOME INSTABILITY AMONG KANSAS COUNTIES: Economic Dependence Classification of Counties and Comparison of County Total Income Instability, 1969-1986

BY

Dwight Dickson

B.A. Kansas State University, 1983

AN ABSTRACT

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ABSTRACT

During the 1970s and 1980s, fluctuations in the volume and value of exports of major U.S. agricultural commodities such as wheat, corn, and soybeans have exerted a destabilizing influence on farm prices and income. In Kansas, the top wheat-producing state, year-to-year percentage fluctuations in the level of real farm income have greatly exceeded real nonfarm income fluctuations.

Related research indicates that export-induced income instability is most keenly felt in those areas which specialize in the production of "export-sensitive" crops. Researchers have classified U.S. counties according to farming dependence and agricultural-export dependence, finding higher farm-sector financial stress and lower economic performance (growth of income, employment, population) in agricultural-export dependent and farming-dependent counties, compared to county groups not dependent on farming.

The purpose of this research is to compare income instability in Kansas agricultural-export dependent counties to other groups of counties, classified according to county-level economic dependence (such as non-export farming-dependent, manufacturing-dependent, and government-dependent counties). In addition to group comparisons, the influence of ag-export dependence on income instability relative to other types of dependence is examined using a single-equation ordinary-least-squares (OLS) regression model.

Fifteen Kansas counties were classified as being agricultural-export dependent. This group experienced a significantly higher average standard deviation of yearly percentage changes in real total county personal income during the 1969-86 period. Considered as an explanatory variable, ag-export dependence showed a much stronger influence on income instability than other types of

dependence, although model specification limitations and the presence of two outliers (counties which disproportionately affect regression results) make further interpretation of regression results difficult.

Kansas agricultural-export dependent counties tend to be located in western Kansas. Relative to other dependence groups and to Kansas, metropolitan-county, and nonmetro-county averages, ag-export dependent counties experienced higher income instability in combination with lower economic performance (slower growth of income, employment, and population, similar per capita income growth).